ORDER NO. SD7901-1505

Service Manual

QUARTZ Synthesizer
Direct Drive Turntable
SP-15 (XG)

• The model SP-15 (XG) is available in European only.

Specifications (Specifications are subject to change without notice.)

General

Power supply:	~ 110-120/220-240V, 50 or 60Hz
Power consumption:	9.5 W
Dimensions: (W x H x D)	34.9 x 9.3 x 37.2 cm (13-3/4x3-21/32x14-41/64 inches)
Weight:	6.2 kg (13.7 lb)

Turntable section

Type:	Quartz phase-locked direct drive with quartz synthesizer pitch control
Drive method:	Direct Drive
Motor:	Brushless DC motor
Drive control method:	Quartz-phase-locked control
Turntable platter:	Aluminum die-cast, diameter 33.9 cm (13-11/32 inches) weight 2.7 kg (5.9 lb)
Moment of inertia:	380 kg·cm^2 (130 lb·in^2)
Turntable speeds:	33-1/3, 45 and 78.26 rpm
Turntable speed fine adjustment:	Adjustable up to ±9.9% in 0.1% increments by digital indication
Starting torque:	3 kg·cm (2.61 lb·in)
Build-up time:	0.4 sec. to 33-1/3 rpm
Braking time:	0.4 sec. from 33-1/3 rpm
Braking system:	Electronic and Mecanical braking
Speed fluctuation due to load torque:	0% within 2.5 kg·cm (2.2 lb·in)
Speed drift:	Within ±0.002%
Wow and flutter:	0.025% WRMS (JIS C5521) ±0.035% peak (IEC 98A Weighted)
Rumble:	–56 dB (IEC 98A Unweighted) –78 dB (IEC 98A Weighted)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

■ TECHNISCHE DATEN

Allgemeine Daten

Stromversorgung:	~110-120-/220-240 V, 50/60 Hz Wechselstrom
Leistungsaufnahme:	9,5 W
Abmessungen:	34,9 x 9,3 x 37,2 cm (B x H x T)
Gewicht:	6,2 kg

Plattenspieler

Typ:	Quartzsteuerung-QPL-Direktantrieb-Plattenspieler mit Quarz-Synthesizer-Drehzahl-Feinregulierung
Antrieb:	Direktantrieb
Motor:	Kollektorloser Gleichstrommotor
Antriebsregei-Methode:	Quarz-Steuerung QPL (Quartz-phase-locked)
Plattenteller:	Aluminium-Spritzguß 33,9 cmø, Gewicht 2,7 kg
Trägheitsmoment:	380kg·cm²
Plattenteller-Drehzahlen:	33-1/3, 45 und 78,26 U/min.
Plattenteller-Drehzahl-Feinregulierung:	Regulierbar über einen Bereich von ±9,9% in Stufen von 0,1%, mit Digial-Anzeige
Anlaufdrehmoment:	3 kg·cm
Hochlaufzeit:	0,4 sec auf 33-1/3 U/min
Bremszeit:	0,4 sec von 33-1/3 U/min
Bremssystem:	Elektronische und mechanische Bremse
Drehzahl-Schwankung wegen Belastungs-Drehmoment:	0% innerhalb 2,5 kg·cm
Drehzahl-Abweichung-	Innerhalb ±0,002%
Gleichlaufschwankungen:	0,025% WRMS (JIS C5521) ±0,035% Spitze (IEC 98A bewertet)
Rumpel-Fremd-Spannungsabstand:	−56 dB (IEC 98A unbewertet)
Rumpel-Geräusch-spannungsabstand:	−78 dB (IEC 98A bewertet)

Änderungen der technischen Daten vorbehalten.

■ CARACTERISTIQUES TECHIQUES

Généralités

Alimentation	Alternatif 110-120/220-240V, 50 ou 60 Hz
Consommation	9,5 W
Dimensions	34,9 x 9,3 x 37,2 cm (L x H x P)
Poids	6,2 kg.

Platine de lecture

Type	Platine automatique à entraînement direct à réglage d'accrochage de phase par quartz, avec réglage d'écart du synthétiseur à quartz
Système d'entraînement	Entraînement direct.
Moteur	Moteur C.C. sans balais.
Groupe de réglage	Réglage d'accorochage de phase par quartz.
Plateau de lecture	Aluminium matricié, diamètre 33,9 cm, poids 2,7 kg.
Moment d'inertie	380 kg·cm²
Vitesses de rotation	33-1/3, 45 et 78,26 t/p.m.
Réglage précis de vitesse du plateau	Réglable jusqu'à ±9,9% avec 0,1 % d'incréments par indication numérique.
Couple de démarrage	3 kg·cm
Durée d'accélération	0,4 sec. à 33-1/3 t/p.m.
Durée de freinage	0,4 sec. à partir de 33-1/3 t/p.m.
Système de freinage	Freins électronique et mécanique.
Variation de vitesse due au couple de charge	0% en deçà de 2,5 kg·cm.
Déviation du nombre de tours	En deçà de ±0,002%
Pleurage et vibrato	0,025% de valeur efficace (UIS C5521), ±0,035% de crête (IEC 98A Pondéré).
Ronflement	−56 dB (IEC 98A Non pondédé). −78 dB (IEC 98A Pondéré).

Les spécifications sont susceptibles d'être modifiées san préavis.

■ DIMENSION DRAWING

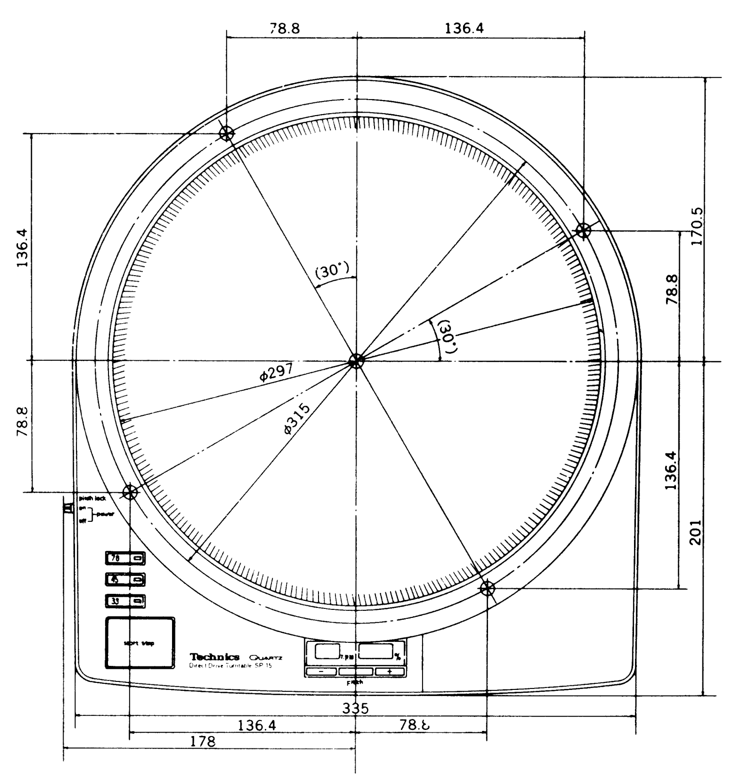

78.8
136.4
136.4
78.8
(30°)
(30°)
φ297
φ315
170.5
78.8
136.4
201
335
136.4
78.8
178

Fig. 1

NOTE:

° Secure the main body with the attached 4 setscrews. When other setscrews are used, find suitable ones in accordance with the dimension drawing.

° In order to make the best use of this turntable, employ a sturdy cabinet (turntable base) which sufficiently withstands the load.

* It is recommended to use the optional turntable (SH-15B1) as the cabinet for SP-15.

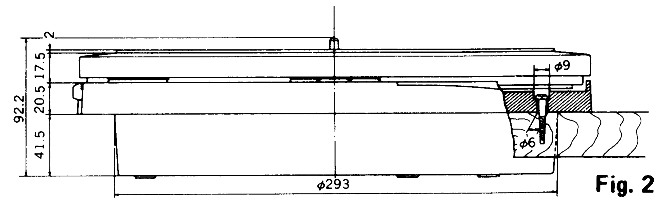

2
17.5
20.5
92.2
41.5
φ9
φ6
φ293

Fig. 2

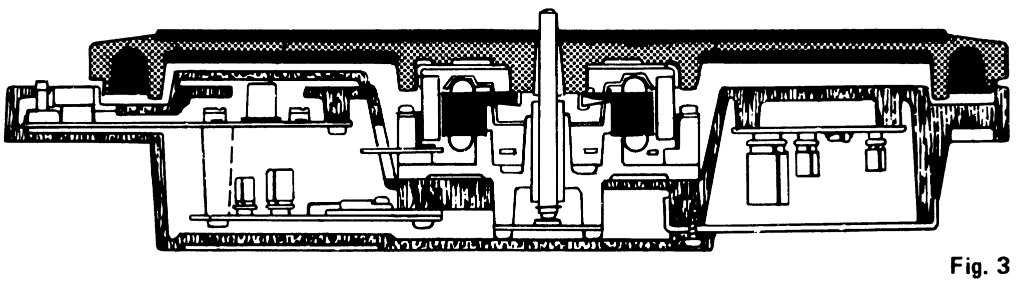


Fig. 3

■ HOW TO OPERATE

1. Set the Power switch/pitch lock knob to the **"on"** position. **(See Fig. 4.)**

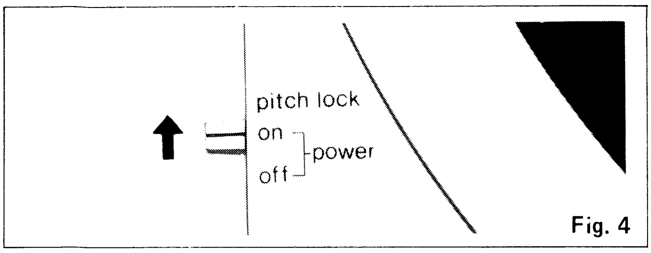

pitch lock
on
power
off

Fig. 4

The revolutions are indicated at 33 (33-1/3 rpm.) of the speed selector knob and digital speed indicator. **(Fig. 5.)**

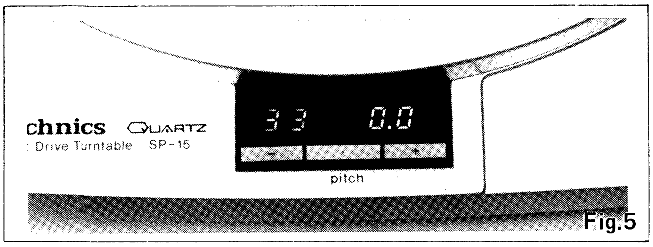

chnics QUARTZ
Drive Turntable SP-15
33 0.0
-
·
+
pitch

Fig.5

Upon setting the power switch/pitch lock knob to **"on"**, the revolutions are changed over to 33-1/3 rmp. at all times. If the record to be played is other than a 33-1/3 rpm., depress the speed select button to suit the phono disc to be played.

When the power switch/pitch lock knob is set to **"pitch lock"**, the pitch control button and speed select button are locked so as not to be actuated even if the buttons are accidentally touched during playing. **(See Fig. 6.)**

Therefore, for selecting the speeds or operating the pitch control, first set the power switch/pitch lock knob to the position **"on"**.

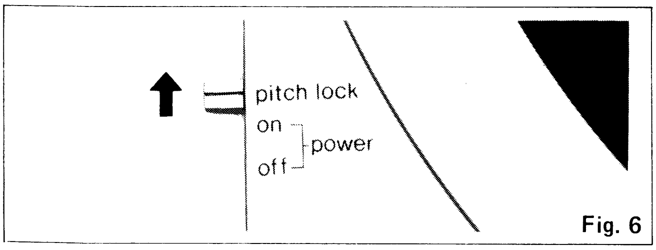

pitch lock
on
power
off

Fig. 6

2. Place a record on the turntable mat.
   Push the start • stop button. **(See Fig. 7.)**
   The turntable platter will begin to rotate and reach its constant rotation speed 0.4 sec. (33-1/3 rpm.).

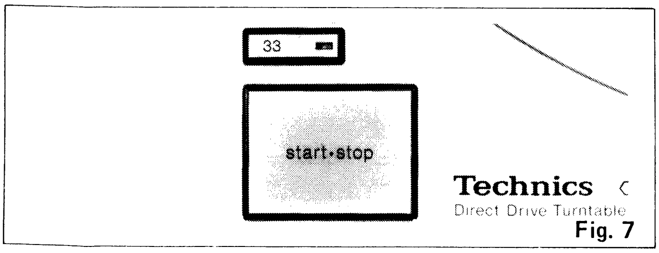

33
start•stop
Technics
Direct Drive Turntable

Fig. 7

3. Upon completion of playing, depress the start • stop button.
   The turntable is instantly (0.4 second) stopped by the double brake system.
4. After that, set the power switch/pitch lock knob to **"off"**. **(See Fig. 8.)**

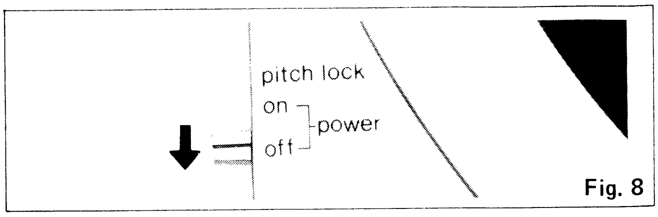

pitch lock
on
power
off

Fig. 8

Pitch control (turntable speed fine adjustment).

The Quartz synthesizer system is being employed for the first time in the world. A high degree of pitch control accuracy over a wide range (±9.9%) in 0.1% increments can be obtained with the quartz perfectly locked.

The pitch control is continuously variable up to 9.9%.

The pitch variations which are clearly indicated by the LED digital indicator provide you with accurate and easy selection.

The pitch control can be selected in increments of 0.1% which is below the threshold of human perception. **(See Fig. 9.)**

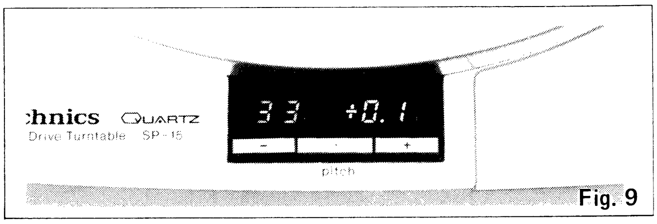

chnics QUARTZ
Drive Turntable SP-15
33 +0.1
-
·
+
pitch

Fig. 9

The pitch control also enables you to accurately and precisely tune musical instruments and by varying the pitch slightly, to obtain a different musical note from the record. **(See Fig. 10.)**

For a half-tone change:

+5.9% (#)
–5.6% (*b*)

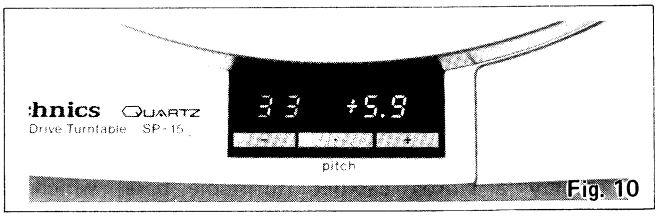

hnics QUARTZ
Drive Turntable SP-15
33 +5.9
-
·
+
pitch

Fig. 10

Another feature of the variable pitch control over a wide range of ±9.9% is that it makes singing along with a melody easy for a chorus, or for playing a record for accompaniment only. **(See Fig. 11.)**

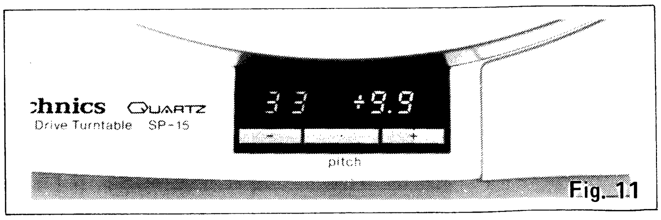

chnics QUARTZ
Drive Turntable SP-15
33 +9.9
-
·
+
pitch

Fig. 11

By pressing the clear button which is located between the "+" and "–" pitch buttons, you can quickly return the set to normal palying speed. **(See Fig. 12.)**

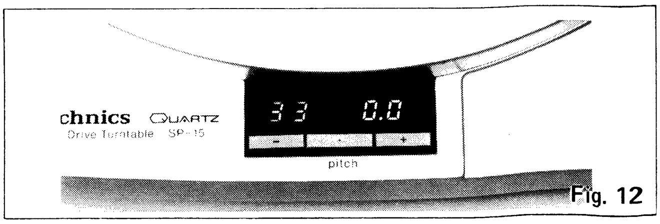

chnics QUARTZ
Drive Turntable SP-15
33 0.0
-
·
+
pitch

Fig. 12

■ FEATURES

Quartz synthesizer system that for the first time in the world has made it possible to achieve a digital pitch control of ±9.9% in 0.1% increments

In conventional quartz players the quartz reference was in effect only within strictly limited ranges: whenever vernier speed change was required, the quartz circuit had to be switched off. In the Technics SP-15, we took the lead by locking the quartz, thus making it possible to effect a high degree of pitch control accuracy over a range as wide as ±9.9% in 0.1% increments, which is below the threshold of human perception.

Moreover, the pitch control, coupled with the clear digital indicator, enables you to accurately and precisely tune with musical instruments, vary pitch slightly for obtaining a musical note from a record or alter tones by a half-note.

Oversized turntable that cuts off and absorbs external vibrations.

Based on analyses of the turntable vibration modes and vibrations in the sound range, a special viscoelastic material is applied to the reverse surface of the turntable platter for deadening.

The deadening material is applied to the undersurface and outer periphery of the turntable platter, with the rubber turntable mat on the surface settled into the turntable platter. This design is superior in acoustic characteristics even at high sound levels through elimination of turntable resonance and absorption of external vibration.

Moreover, the oversized aluminum die-cast turntable platter, 33.9 cm (13-11/32") in diameter, is heavy with 2.7 kg (5.9 lb.) of its own weight, with a moment of inertia of 380 kg cm^2 (130 lb. in^2) for large heavy weight class design.

Vibration damping structure by the precision aluminum die-cast cabinet and TNRC.

The acoustical characteristics of the player system are inevitably affected by the turntable platter and cabinet employed. The SP-15 adopts an aluminum die-cast cabinet superior in strength, with high processing accuracy, and the new acoustic material TNRC excellent in acoustical properties. Through cutting-off and absorption of external vibrations, the unit is designed for improved acoustic characteristics, with susceptibility to feedback minimized.

Electronic circuits of more than 3,000 discrete elements concentrated into 4ICs

The 4 kinds of IC, i.e., Synthesizer pitch control CMOS LSI (MN 6042), Frequency dividing IC employing I^{2}L, ECL (DN 860), phase speed control IC (AN 660) and Driving IC (AN 640) into which high density electronic circuits of more than 3,000 discrete elements have been compressed have made it possible to produce this high precision quartz turntable.

Quartz Controlled Rotation Accuracy

The SP-15 utilizes the oscillation of a quartz crystal as a reference signal or source. This oscillation is not affected by temperature change or power fluctuations. By synchronizing the rotation of the turntable platter accurately to the reference signal, speed drift of the unit is held within ±0.002%.

Technics' unique motor construction in which the rotor of the motor is integrally formed with the turntable

High torque motor of 3 kg·cm with starting time of 0.4 second is capable of instant speed change-over (at 33-1/3 rpm.).

With the double braking system of the electronic brake and mechanical brake, the turntable stops instantly (0.4 second) upon depression of the start • stop button (at 33-1/3 rpm.)

High performance with wow and flutter of only 0.025% (JIS C5521) and rumble of −78 dB (IEC 98A Weighted).

Pitch lock mechanism capable of locking the speed selection and pitch control operation

Malfunction caused by accidental touching of the operating portion during playing, can be prevented.

Highly efficient pulse power supply circuit is employed for the DC power source

Since DC voltage is obtained by oscillating high frequency (20 kHz) through direct rectification of AC power supply for voltage conversion at the pulse transformer, there is no leakage of the commercial power source frequency.

Stable and positive mechanism that can stand frequent use for business use, etc. and a switch section with point contacts.

Revolutions at 3 speeds of 33-1/3, 45 and 78.26 rpm. are employed, taking into account business use.

■ RUBRICATION

Apply 2 or 3 drops of oil once after every 2000 hours of operation. **(See Fig. 13.)**

This time interval is much longer than that of conventional type motors (200–500 hours).

Please purchase original brand of oil (Parts number is **SFWO 010.)**

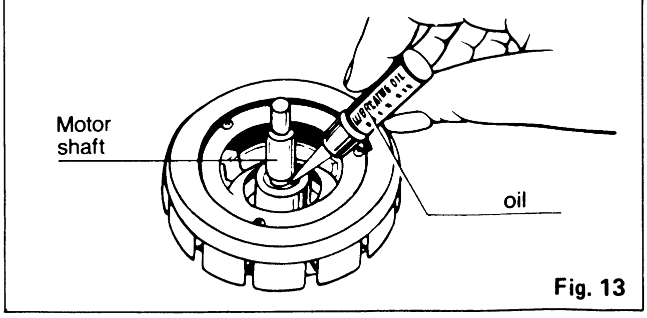


Fig. 13

■ TECHNICAL DESCRIPTION

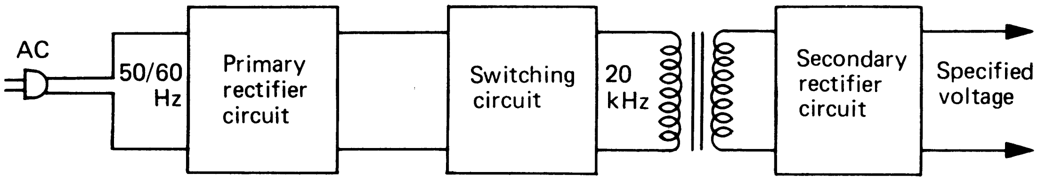
• Description of pulse power supply circuit

The pulse power supply circuit serves to rectify the commercial power directly with diodes to produce DC voltage. Then it performs the switching of the DC voltage with a special transistor for high speed switching in order to generate pulses (rectangular waves of about 20 KHz).

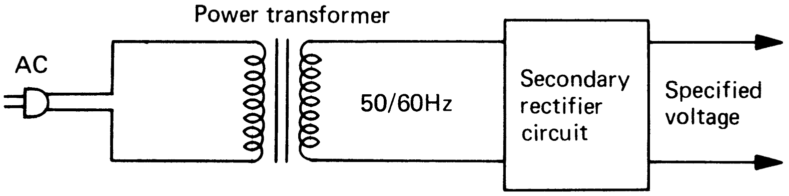
The pulse power supply circuit is designed to obtain the specified voltage on the secondary side by driving the power supply transformer with the switching pulse.

The pulse power supply circuit and a conventional power supply block are shown in Fig. 14.

Power supply circuit blocks


AC
50/60 Hz
Primary rectifier circuit
Switching circuit
20 kHz
Secondary rectifier circuit
Specified voltage

(a) Pluse power source block


Power transformer
AC
50/60Hz
Secondary rectifier circuit
Specified voltage

(b)Conventional power supply block

Fig. 14

• Pulse power supply circuit of SP-15

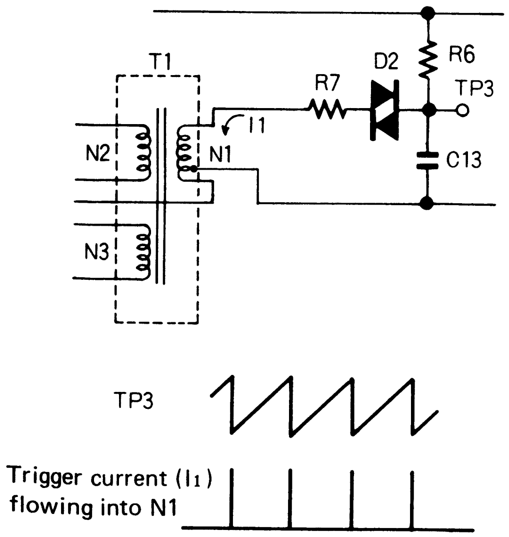
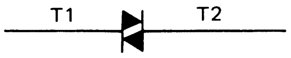

T1
D2
R6
R7
TP3
I1
N2
N1
C13
N3
TP3
Trigger current (I1) flowing into N1

Fig. 15

1. With power supply turned ON, C13 is charged through R6. When the charged voltage becomes high enough to turn on trigger diode D2, current (I1) flows through R7. Then, C13 is discharged and, therefore, it is again charged through R6. As the operations are repeated, trigger current flows into N1 as shown in Fig. 15.

*** Trigger diode**

When a voltage higher than the specification is applied between terminals T1 and T2, it works to flow a current irrespective of the polarity.



• Switching circuit operation

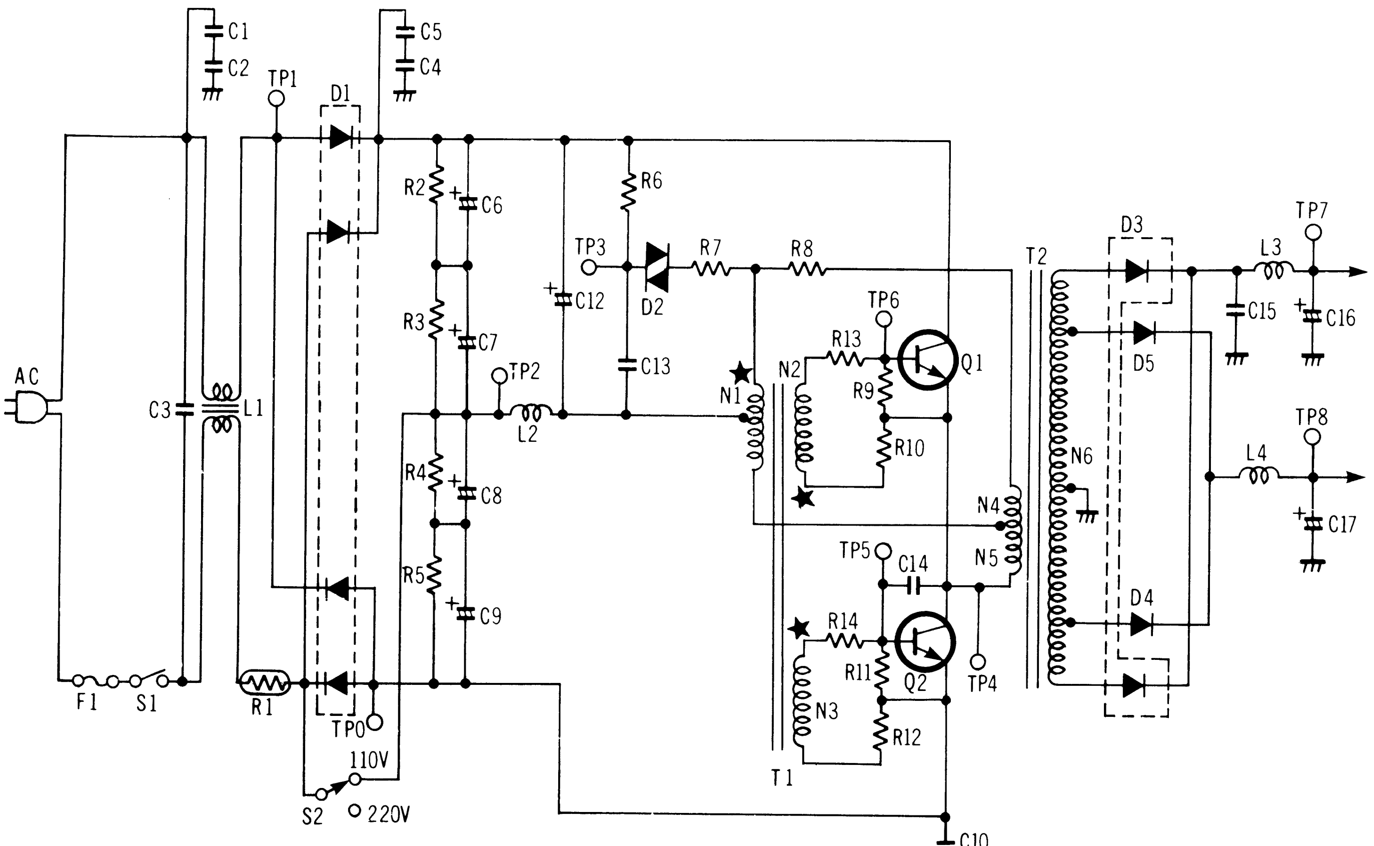
❶ Commercial power is rectified by D1, R2 ~ R5 and C6 ~ C9 through line filter L2 to obtain a DC voltage. The DC voltage is split by R2, R3, and R4, R5.

❷ C13 is charged through R6, and when trigger Diode D2 becomes ON level, the trigger current flows from D2 → R7 → N1. Since the coils of N2 and N3 are reverse in phase, when the current flowing in the N1 coil is in the direction of ↓, base currents are generated at N2 and N3, respectively for the reverse bias of Q1 and the forward bias of Q2. Accordingly, Q1 turns off and Q2 turns on, causing the primary side current of T2 to flow from N1 → N5 → Q2 (C-E) → TP.O. At that time, feedback current flows into N1 through R8. The current flowing into N1 is of positive feedback, keeping Q1 turned off and Q2 on, then the collector current of Q2 continues to increase in accordance with the inductance of N5.

❸ Since N3 being directly connected between Q2 base and emitter is proximately short-circuited, the feedback current is saturated at a specific value determined by R8. In this case, the Q2 base current decreases in accordance with the inductance of N3. If the Q2 base current is going to decrease, a corresponding electromotive voltage is generated at N1, causing the feedback current to flow in the opposite direction, thus creating a positive feedback line for Q1. Consequently, Q1 turns on and Q2 turns off, and the primary side current of T2 flows from TP. 3 → Q1 (C-E) → N5 → TP. 2. Similarly, when the current reaches its saturation point, it is changed to a positive feedback line for Q2.

❹ Oscillation is continued through repetition of the above operations, and 20 KHz pulse voltage can be obtained at N6 on the secondary side of T2.

Fig. 16 Switching circuit
(★ - mark shows the polarity of coil.)


C1
C2
TP1
D1
C5
C4
R2
C6
R6
TP3
R7
R8
T2
D3
TP7
L3
C12
D2
R3
C7
TP6
R13
C15
C16
D5
AC
C3
L1
TP2
C13
N1
N2
R9
Q1
TP8
L2
R10
N6
L4
R4
C8
N4
C17
TP5
C14
N5
R5
C9
R14
D4
R11
Q2
TP4
F1
S1
R1
TP0
N3
R12
110V
T1
S2
220V
C10
C11

■ DISASSEMBLY PROCEDURE

How to remove bottom cover and shielding plate.

1. Remove the turntable rubber and turntable, and then turn the main body upside down.
2. Remove 12 setscrews of the bottom cover. (See Fig.17.)

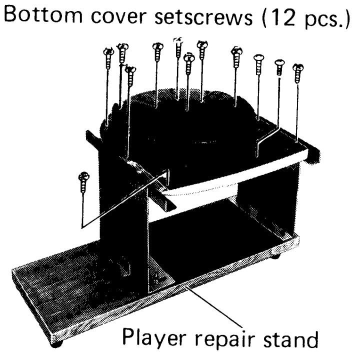

Bottom cover setscrews (12 pcs.)
Player repair stand

Fig. 17

3. **Remove 7 setscrews of the shielding cover.** (See Fig.18.)

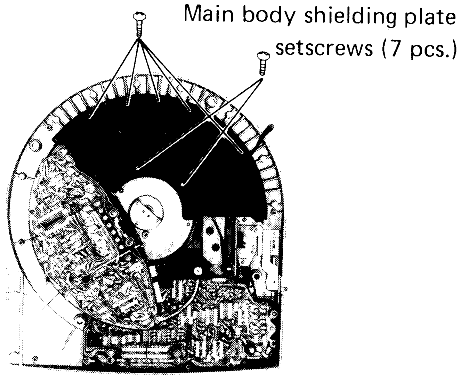

Main body shielding plate setscrews (7 pcs.)

Fig. 18

How to remove drive circuit board (See Fig.19.)

1. Detach connector A from the solenoid, and drive connector B from the logical circuit board.
2. Remove 6 setscrews of the drive circuit board.
3. Remove the drive circuit board, and detach the motor drive connector and the power line connector from the drive circuit board. Thus, the drive circuit board can be removed.

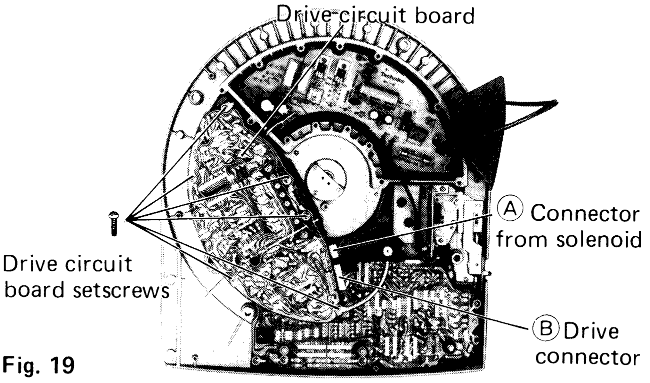

Drive circuit board
Ⓐ Connector from solenoid
Drive circuit board setscrews
Ⓑ Drive connector

Fig. 19

How to remove power supply circuit board and logical circuit board (See Fig.20.)

1. Remove 5 setscrews of the power supply circuit board.

   Note: Take special care when disassembling the power supply section because the circuit board is supplied with a high voltage.
2. Remove 2 setscrews of the earth terminal plate.
3. Remove 7 setscrews of the logical circuit board.
4. Detach the logical circuit board and the 2P lock switch connector.

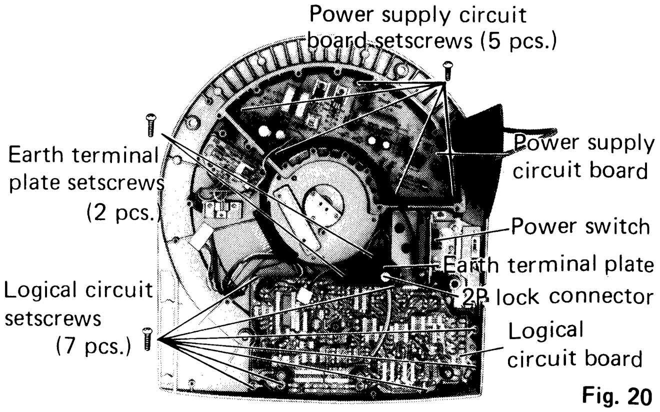

Power supply circuit board setscrews (5 pcs.)
Earth terminal plate setscrews (2 pcs.)
Power supply circuit board
Power switch
Earth terminal plate
2P lock connector
Logical circuit setscrews (7 pcs.)
Logical circuit board

Fig. 20

How to remove stator frame

1. Remove the drive circuit board in accordance with the above-mentioned procedure.
2. Turn the main body up and remove 3 setscrews of the stator frame. (See Fig.21.)

(marked 3 setscrews)

Remarks:
For the disassembly of mechanical parts other than the above (such as power switch plate, brake operating plate, etc.), refer to the exploded views in this manual.

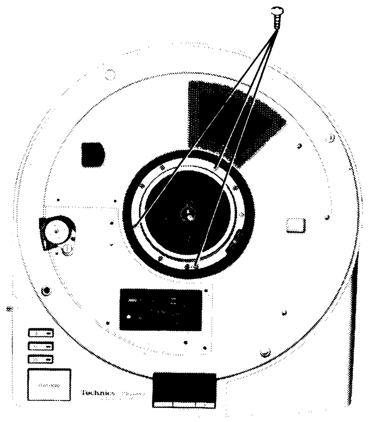

Stator frame setscrews (3 pcs.)

Fig. 21

Repair of drive circuit and logical circuit (Figs. 22 and 23.)

1. Detach the bottom cover with reference to the disassembly procedure.
2. Put the set on the repair stand with its front up.
3. Mount the turntable.

Then, carry out the check of each part in accordance with the Trouble Shooting Chart. Also use a stroboscope when checking the number revolutions.

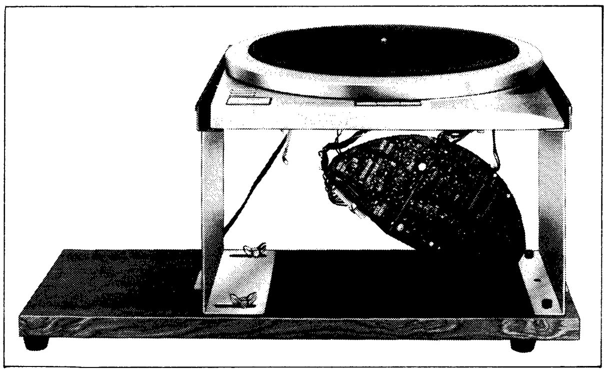


Fig. 22

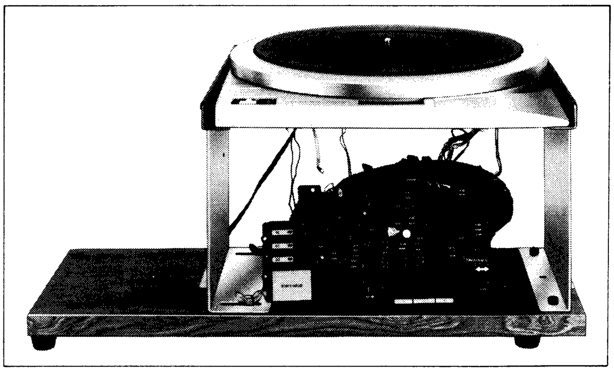


Fig. 23

Repair of power supply circuit

1. Remove the bottom cover and the shielding plate with reference to the disassembly procedure.
2. Carry out the check of each part according to the Trouble Shooting Chart with reference to the test points printed on the power supply circuit.

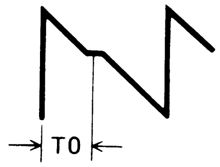
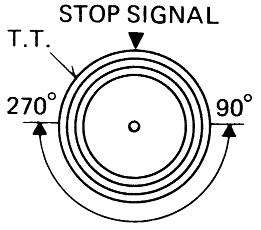
• Hinweise nach ausgeführter Reparatur

Nach Vollendung der Reparatur die Abschirmplatte des Hauptkörpers und die Bodenplatte mit besonderer Sorgfalt einwandfrei montieren. Bei ungenügender Montage kann die AM-Sendung oder der Tonarm mit gestört werden, da der Netzanschlußkreis für Schaltung 20 kHz verwendet. Anßerdem muß das Gerät vorsichtig behandllt werden, weil es mit hoher Spannung angelegt ist.

■ ADJUSTMENTS

Adjustment Points of Electrical System

NOTE: Make the following adjustments after replacing parts such as IC's, transistors, diodes, etc.

	Adjustment	Connection Points	Adjustment Point	Adjustment Method
1	Adjustment of standard voltage (VS)	DC voltmeter or Oscilloscope ⊕ → TP38 ⊖ → GROUND	VR301	With the start switch set at ON, adjust VR301 so that the voltage is DC 2.10V ±0.01 at 33 r.p.m. Confirm that the voltage is 2.835V ±0.05V at 45 r.p.m. and 4.9V ±0.1V at 78 r.p.m.
2	Adjustment of current source (IR)	DC voltmeter or Oscilloscope ⊕ → TP19 ⊖ → TP21	VR201	Turn start switch on to begin turntable rotation. Adjust VR201 for 0 V potential difference of TP19 and TP21.
3	Tracking adjustment (TRACKING)	Oscilloscope ⊕ → TP18 ⊖ → GROUND	VR101	TP18 waveform  With the start switch set at ON, adjust VR101 so that $8 \leqq T0 \leqq 8.5$ ms at 33 r.p.m. Confirm that $5.8 \leqq T0 \leqq 6.4$ms at 45 r.p.m. and $3 \leqq T0 \leqq 4.5$ ms at 78 r.p.m.
4	Braking adjustment (BRAKE)	——	VR202	 Adjust VR202 for complete stop within 90° ~ 270° after stop signal initiated. (Turntable becomes free a few seconds after stop.)

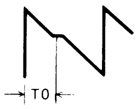
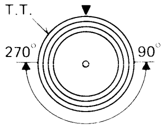
• After-repair precautions

After completion of the repair, install the main body shielding plate and the bottom cover with special care. If their installation is incomplete, the AM broadcast or the cartridge will be interferred with noise because the power supply circuit uses 20 kHz for switching. In addition, the equipment should be carefully handled as it is supplied with a high voltage.

■ JUSTIERUNGEN

Justierungspunkte des elektrischen Systems

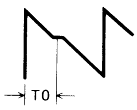
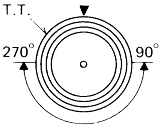
Bemerkung: Nehmen Sie die folgenden Justierungen nach erfolgtem Austausch von Teilen, wie IC's, Transistoren, Dioden, usw. vor.

	Justierung	Verbindungspunkte	Justierungspunkt	Justierungsmethode
1	Justierung der Nennspannung (VS)	Gleichstrom-Voltmeter oder Oszilloskop ⊕ → TP38 ⊖ → GROUND	**VR301**	Startschalter auf ON stellen, VR301 so regulieren, daß die Gleichspannung bei 33 U/min DC 2.10V ±0.01 beträgt. Feststellen, daß die Spannung 2,835 V ±0,05 V bei 45 m/min und 4,9 V ±0,1 V bei 78 U/min beträgt.
2	Justierung der Stromquelle (IR)	Gleichstrom-Voltmeter oder Oszilloskop ⊕ → TP19 ⊖ → TP21	**VR201**	Start-Schalter drehen, um die Plattentellerdrehung zu starten. VR201 auf eine Spannungsdifferenz von 0V zwischen TP19 und TP21 justieren.
3	Abtast-Justierung (TRACKING)	Oszilloskop ⊕ → TP18 ⊖ → GROUND	**VR101**	 Startschalter auf ON stellen, VR101 so gegulieren, daß 8 ⩾To ⩽8,5 ms bei 33 U/min. Feststellen, daß 5,8 ⩽To ⩾6,4 ms bei 45 U/min und 3 ⩽To ⩽4,5 ms bei 78 U/min.
4	Brems-Justierung (BRAKE)	————	**VR202**	 VR202 für vollständigen Stop innerhalb 90° ~270° nach erfolgtem Stopsignal abgleichen. (Plattenteller wird wenige Sekunden nach dem Stop freigestellt.)

■ REGLAGES

Points de réglade du système électrique.

NOTA: Réaliser les mises au point suivantes après le remplacement de certains éléments tels que circuits intégrés, transistors, diodes, etc.

	Réglage	Points de branchements	Point de réglage	Méthode de réglage
1	Réglage de la tension normalisée (VS)	Voltmètre à CC ou Oscilloscope. ⊕ → TP38 ⊖ → GROUND	**VR301**	Avec le commutateur de départ réglé sur la position ON (marche), régler le VR301 de telle sorte que la tension soit de 2,10V ±0.01V CC à 33 tours par minute. Vérifier que la tension est de 2,835V ±0,05V à 45 tours par minute et de 4,9V ±0,1V à 78 tours par minute.
2	Réglage de la source de courant (IR)	Voltmètre à CC ou Oscilloscope. ⊕ → TP19 ⊖ → TP21	**VR201**	Ouvrir le commutateur de marche pour le démarrage rotationnel du plateau. Régler VR201 pour une différence potentielle 0V de TP19 et TP21.
3	Réglage d'alignement (TRACKING)	Oscilloscope ⊕ → TP18 ⊖ → GROUND	**VR101**	 Avec le commutateur de départ placé sur la position ON (marche), régler le VR101 de telle sorte que 8 ⩽ TO ⩽ 8.5 ms à 33 tpm. Vérifier que 5,8 ⩽TO ⩽6,6 ms à 45 tpm et que 3 ⩽ TO ⩽4,5 à 78 tpm.
4	Réglage du freinage (BRAKE)	————	**VR202**	 Régler VR202 pour un arrêt total en deçà de 90° – 270° après que le signal d'arrêt ait débuté. (Le plateau deviendra libre quelques secondes après l'arrêt).

■ ADJUSTMENT OF MECHANICAL BRAKE

The mechanical brake has been already factory-adjusted before delivery. However, if the brake creates abnormal noise during operation or fails to work as specified, make its adjustment in accordance with the following procedure.

❶ Remove the turntable and the main body cover.
(Refer to the exploded views.)
❷ Loosen the screw Ⓐ and put the turntable in place.
❸ Turn on the power switch and then regulate adjust screw Ⓑ through the hole in the turntable so that the brake shoe is about 1 mm off the turntable being released while turning on and off the start/stop switch. After that, tighten the screw Ⓐ completely.

The above procedure is enough to complete the adjustment of the brake operating position. But if the brake shoe is worn out, loosen the screw Ⓒ and properly shift the brake shoe.

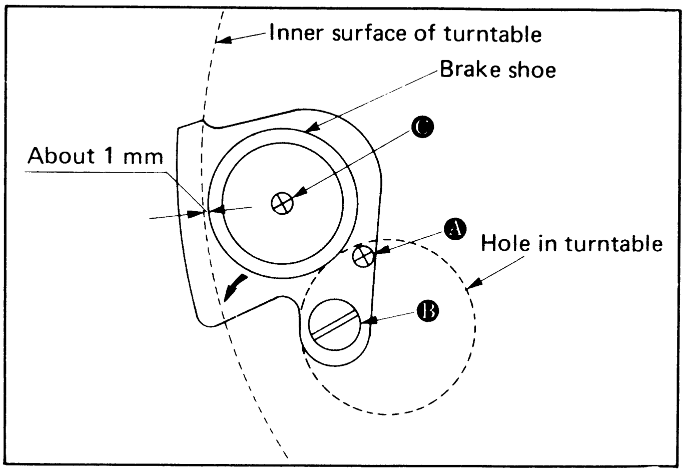


Fig. 24 Mechanical brake system

■Einstellung der mechanischen Bremse

Die mechanische Bremse ist bereits vor Lieferung im Werk eingestellt. Wenn jedoch die Bremse während des Betriebs anomales Geräusch entwickelt oder nicht wie vorgeschrieben arbeitet, die Einstellung gemäß dem folgenden Verfahren vornehmen.

❶ Den Plattenteller und Hauptkörperdecke abnehmen.
(Vgl. Abwicklungszeichnung)
❷ Die Schraube Ⓐ lösen und den Plattenteller wieder auflegen.
❸ Netzschalter einschalten und dann durch das Loch im Plattenteller die Stellschraube Ⓑ regulieren, so daß die Bremsbacke beim Lösen ca. 1 mm vom Plattenteller entfernt ist, während der Start- und Stopschalter auf ON and OFF geschaltet wird. Danach die Schraube Ⓐ fest anziehen.

Auf diese Weise läßt sich die Arbeitsposition der Bremse vollständig einstellen. Wenn die Bremsbacke abgenutzt ist, die Schraube Ⓒ lösen und die Anlagestelle der Bremse verschieben.

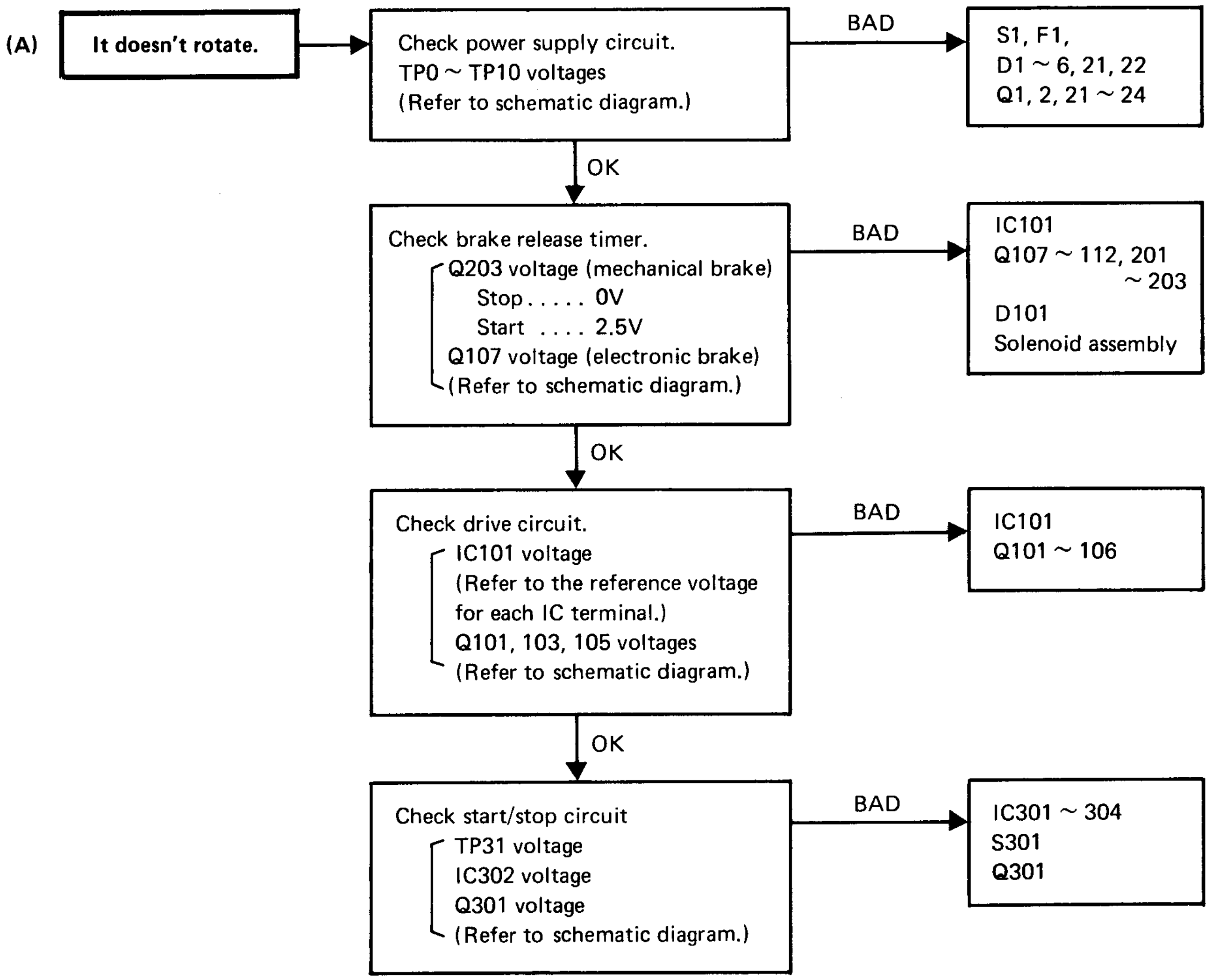
■Réglage du frein mécanique

Le frein mécanique a déjá été réglé en usine avant la livraison. Toutefois, si le frein fait un bruit anormal pendant son fonctionnement ou s'il ne fonctionne pas quand il le devrait, le régler en fonction du procédé suivant.

❶ Enlever la platine et le couvercle du chassis principal.
(voir le dessin détaillé)
❷ Desserrer la via Ⓐ et monter la platine.
❸ Allumer le commutateur d'alimentation et régler la vis de réglage Ⓑ par le trou de la platine de telle sorte que le sabot de frein soit à environ 1 mm de la platine quand celleci est libérée, tout en allumant et en éteignant le commutateur marche/arrêt. Puis, serrer complétement la vis Ⓐ .

Le procédé ci-dessus est suffisant pour terminer le réglage de la position de fonctionnement du frein. Mais si le sabot de frein est usé, desserrer la vis Ⓒ et correctement déplacer le sabot de frein.

■ TROUBLE SHOOTING



(A) **It doesn't rotate.**

Check power supply circuit.
TP0 ~ TP10 voltages
(Refer to schematic diagram.)

BAD → S1, F1,
D1 ~ 6, 21, 22
Q1, 2, 21 ~ 24

OK

Check brake release timer.
Q203 voltage (mechanical brake)
Stop 0V
Start 2.5V
Q107 voltage (electronic brake)
(Refer to schematic diagram.)

BAD → IC101
Q107 ~ 112, 201 ~ 203
D101
Solenoid assembly

OK

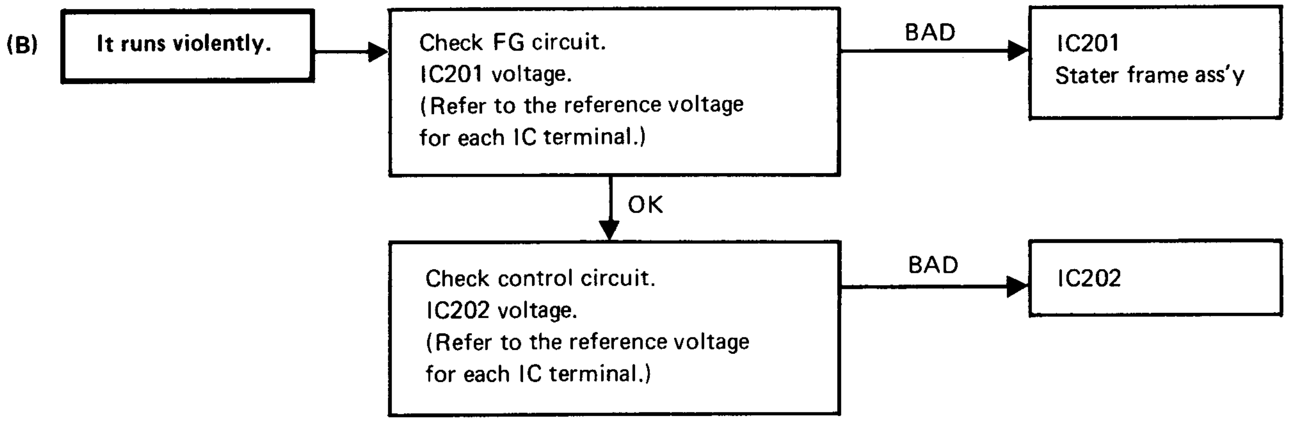
Check drive circuit.
IC101 voltage
(Refer to the reference voltage for each IC terminal.)
Q101, 103, 105 voltages
(Refer to schematic diagram.)

BAD → IC101
Q101 ~ 106

OK

Check start/stop circuit
TP31 voltage
IC302 voltage
Q301 voltage
(Refer to schematic diagram.)

BAD → IC301 ~ 304
S301
Q301



(B) **It runs violently.**

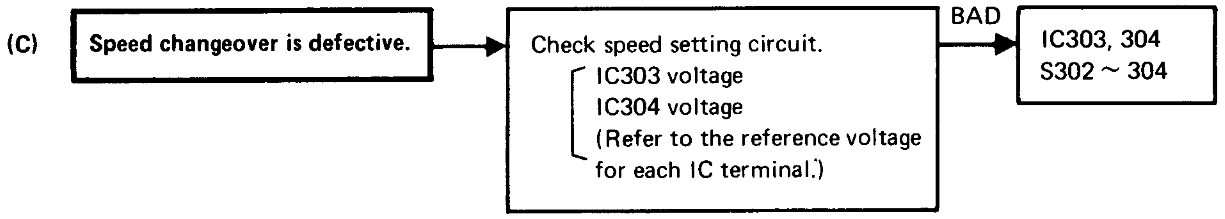
Check FG circuit.
IC201 voltage.
(Refer to the reference voltage for each IC terminal.)

BAD → IC201
Stater frame ass'y

OK

Check control circuit.
IC202 voltage.
(Refer to the reference voltage for each IC terminal.)

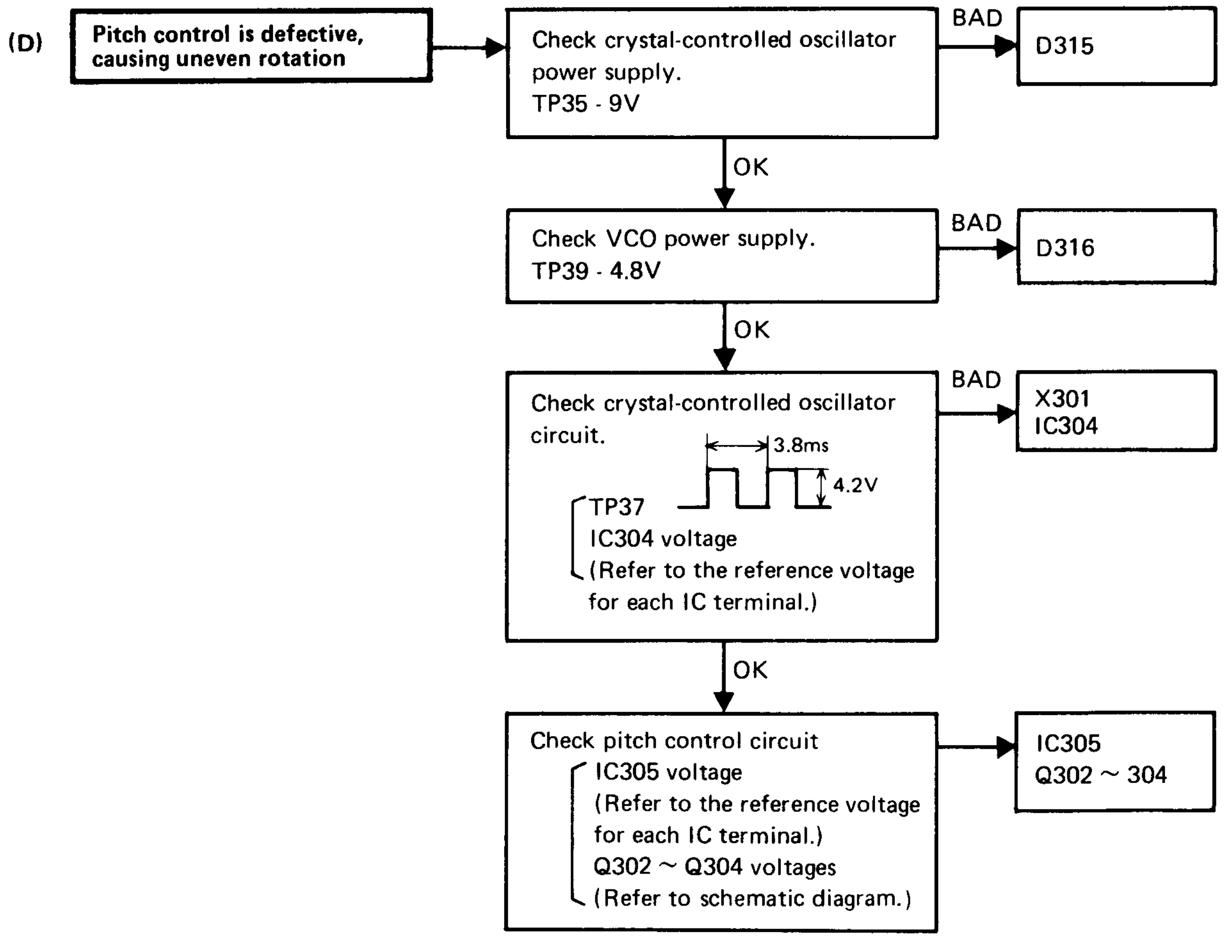
BAD → IC202



(C) **Speed changeover is defective.**

Check speed setting circuit.
IC303 voltage
IC304 voltage
(Refer to the reference voltage for each IC terminal.)

BAD → IC303, 304
S302 ~ 304



(D) **Pitch control is defective, causing uneven rotation**

Check crystal-controlled oscillator power supply.
TP35 - 9V

BAD → D315

OK

Check VCO power supply.
TP39 - 4.8V

BAD → D316

OK

Check crystal-controlled oscillator circuit.
TP37
IC304 voltage
(Refer to the reference voltage for each IC terminal.)

BAD → X301
IC304

OK

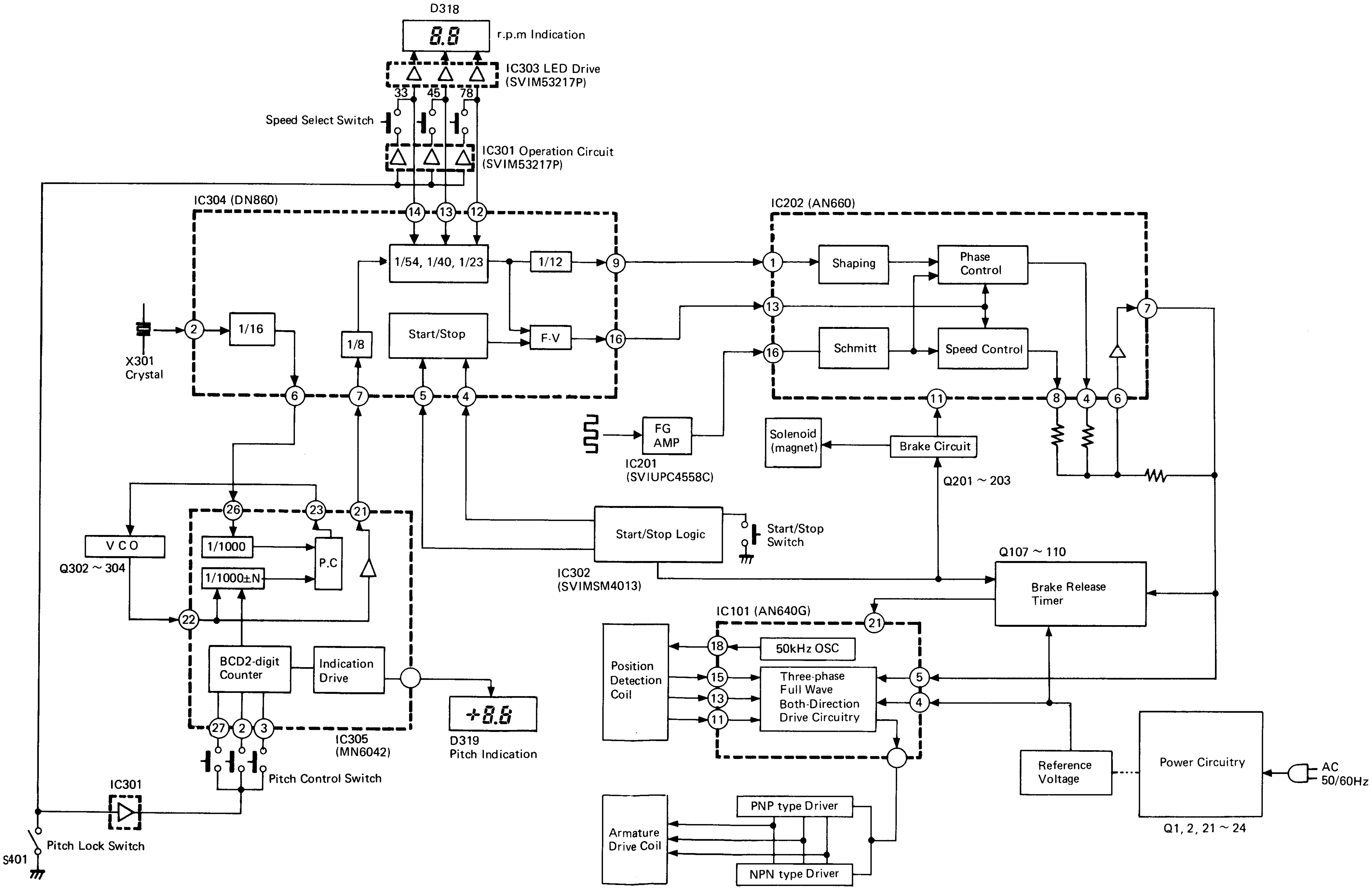
Check pitch control circuit
IC305 voltage
(Refer to the reference voltage for each IC terminal.)
Q302 ~ Q304 voltages
(Refer to schematic diagram.)

→ IC305
Q302 ~ 304

Précautions à prendre après les réparations

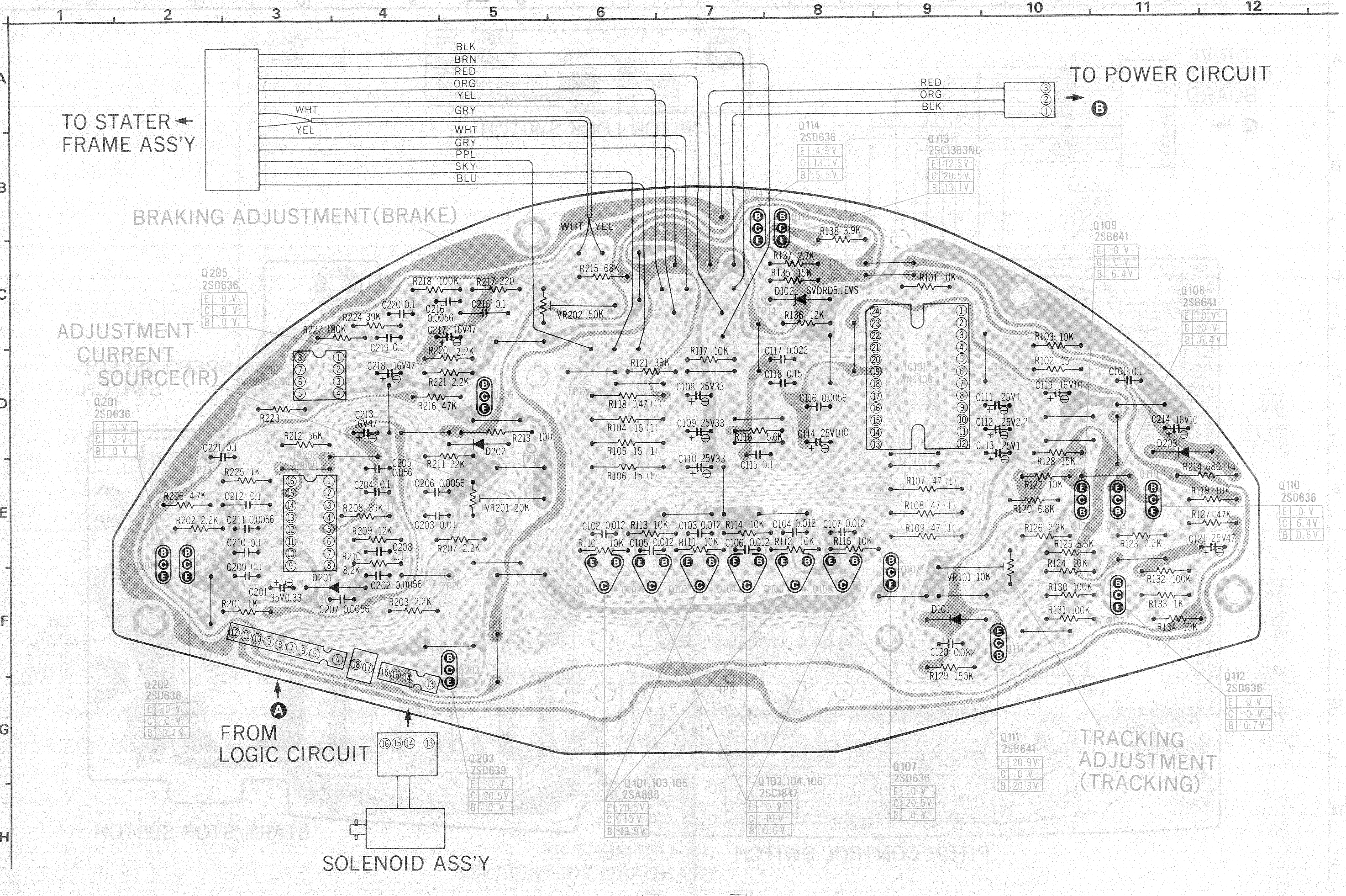
A la fin des réparations, monter la plaque de blindage du châssis principal et la couverture de base, avec une attention spéciale. Si ce montage n'est pas terminé, les émissions MA ou la cassette produira un bruit d'interférence, parce que le circuit d'alimentation électrique utilise 20 kHz pour la commutation.
De plus, l'appareil doit être prudemment manipulé car il est alimenté par une haute tension.

■ BLOCK DIAGRAM


D318
8.8
r.p.m Indication
IC303 LED Drive
(SVIM53217P)
33
45
78
Speed Select Switch
IC301 Operation Circuit
(SVIM53217P)
IC304 (DN860)
14
13
12
1/54, 1/40, 1/23
1/12
9
2
1/16
1/8
Start/Stop
F-V
16
X301
Crystal
6
7
5
4
IC202 (AN660)
1
Shaping
Phase
Control
13
7
16
Schmitt
Speed Control
11
8
4
6
FG
AMP
IC201
(SVIUPC4558C)
Solenoid
(magnet)
Brake Circuit
Q201 ~ 203
26
23
21
VCO
Q302 ~ 304
1/1000
1/1000±N
P.C
22
BCD2-digit
Counter
Indication
Drive
27
2
3
IC305
(MN6042)
Pitch Control Switch
+8.8
D319
Pitch Indication
Start/Stop Logic
Start/Stop
Switch
IC302
(SVIMSM4013)
Q107 ~ 110
Brake Release
Timer
IC101 (AN640G)
21
Position
Detection
Coil
18
50kHz OSC
15
13
11
Three-phase
Full Wave
Both-Direction
Drive Circuitry
5
4
Reference
Voltage
Power Circuitry
AC
50/60Hz
Q1, 2, 21 ~ 24
Armature
Drive Coil
PNP type Driver
NPN type Driver
IC301
Pitch Lock Switch
S401

Printed Circuit Board (Drive Circuit)

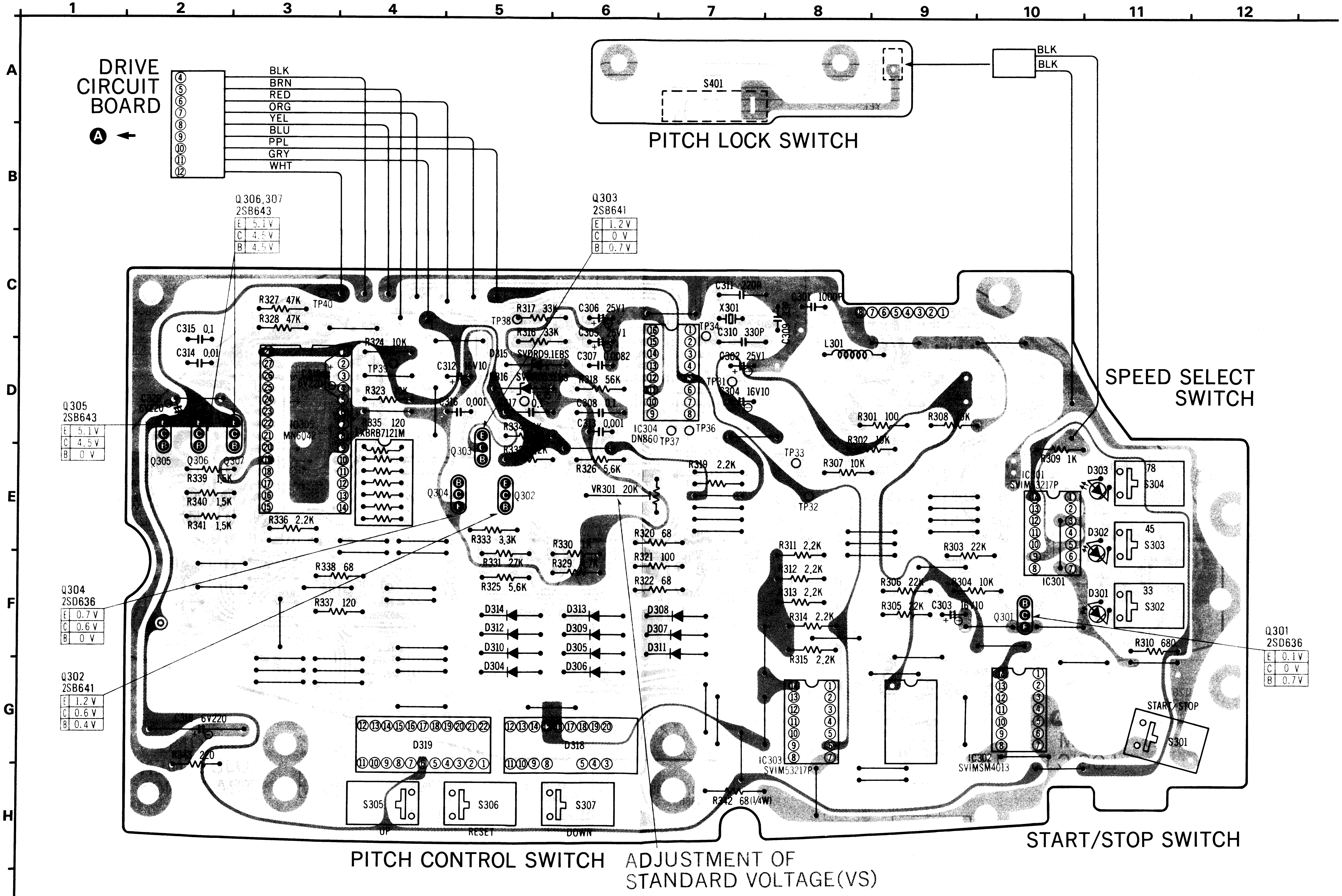
▨ ⊕B Lines
▨ Earth (Ground) Lines


1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H
TO STATER FRAME ASS'Y
BLK
BRN
RED
ORG
YEL
WHT
GRY
YEL
WHT
GRY
PPL
SKY
BLU
TO POWER CIRCUIT
RED
ORG
BLK
③ ② ①
B
BRAKING ADJUSTMENT(BRAKE)
ADJUSTMENT CURRENT SOURCE(IR)
WHT YEL
Q114 2SD636 E 4.9V C 13.1V B 5.5V
Q113 2SC1383NC E 12.5V C 20.5V B 13.1V
Q109 2SB641 E 0V C 0V B 6.4V
Q108 2SB641 E 0V C 0V B 6.4V
Q110 2SD636 E 0V C 6.4V B 0.6V
Q112 2SD636 E 0V C 0V B 0.7V
Q111 2SB641 E 20.9V C 0V B 20.3V
Q107 2SD636 E 0V C 20.5V B 0V
Q101,103,105 2SA886 E 20.5V C 10V B 19.9V
Q102,104,106 2SC1847 E 0V C 10V B 0.6V
Q203 2SD639 E 0V C 20.5V B 0V
Q202 2SD636 E 0V C 0V B 0.7V
Q201 2SD636 E 0V C 0V B 0V
Q205 2SD636 E 0V C 0V B 0V
R138 3.9K
R137 2.7K
R135 15K
D102 SVDRD5.1EVS
R136 12K
R101 10K
R215 68K
R218 100K
R217 220
C220 0.1
C216 0.0056
C215 0.1
VR202 50K
R224 39K
R222 180K
C217 16V47
C219 0.1
R220 2.2K
IC201 SVIUPC4558C
C218 16V47
R221 2.2K
R216 47K
R223
C213 16V47
R212 56K
R213 100
D202
R211 22K
C221 0.1
IC202 AN6601
C205 0.056
R225 1K
C204 0.1
C206 0.0056
R206 4.7K
C212 0.1
R208 39K
VR201 20K
R202 2.2K
C211 0.0056
C203 0.01
R209 12K
C210 0.1
C208 0.1
R207 2.2K
C209 0.1
R210 8.2K
D201
C201 35V0.33
C202 0.0056
C207 0.0056
R201 1K
R203 2.2K
R121 39K
R117 10K
C117 0.022
C118 0.15
R118 0.47 (1)
C108 25V33
C116 0.0056
R104 15 (1)
C109 25V33
R116 5.6K
C114 25V100
R105 15 (1)
C110 25V33
C115 0.1
R106 15 (1)
IC101 AN640G
R103 10K
R102 15
C119 16V10
C101 0.1
C111 25V1
C112 25V2.2
C113 25V1
C214 16V10
D203
R214 680 (1/4)
R128 15K
R122 10K
R107 47 (1)
R108 47 (1)
R109 47 (1)
R120 6.8K
R119 10K
R127 47K
R126 2.2K
R125 3.3K
R123 2.2K
C121 25V47
R124 10K
C102 0.012
R113 10K
C103 0.012
R114 10K
C104 0.012
C107 0.012
R110 10K
C105 0.012
R111 10K
C106 0.012
R112 10K
R115 10K
Q101 Q102 Q103 Q104 Q105 Q106 Q107 Q108 Q109 Q110 Q111 Q112 Q201 Q202 Q203 Q205
VR101 10K
R130 100K
R132 100K
R131 100K
R133 1K
R134 10K
D101
C120 0.082
R129 150K
TP11 TP12 TP14 TP15 TP16 TP17 TP19 TP20 TP21 TP22 TP23
⑫ ⑪ ⑩ ⑨ ⑧ ⑦ ⑥ ⑤ ④ ⑱ ⑰ ⑯ ⑮ ⑭ ⑬
A
FROM LOGIC CIRCUIT
⑯⑮⑭ ⑬
SOLENOID ASS'Y
TRACKING ADJUSTMENT (TRACKING)

Printed Circuit Board

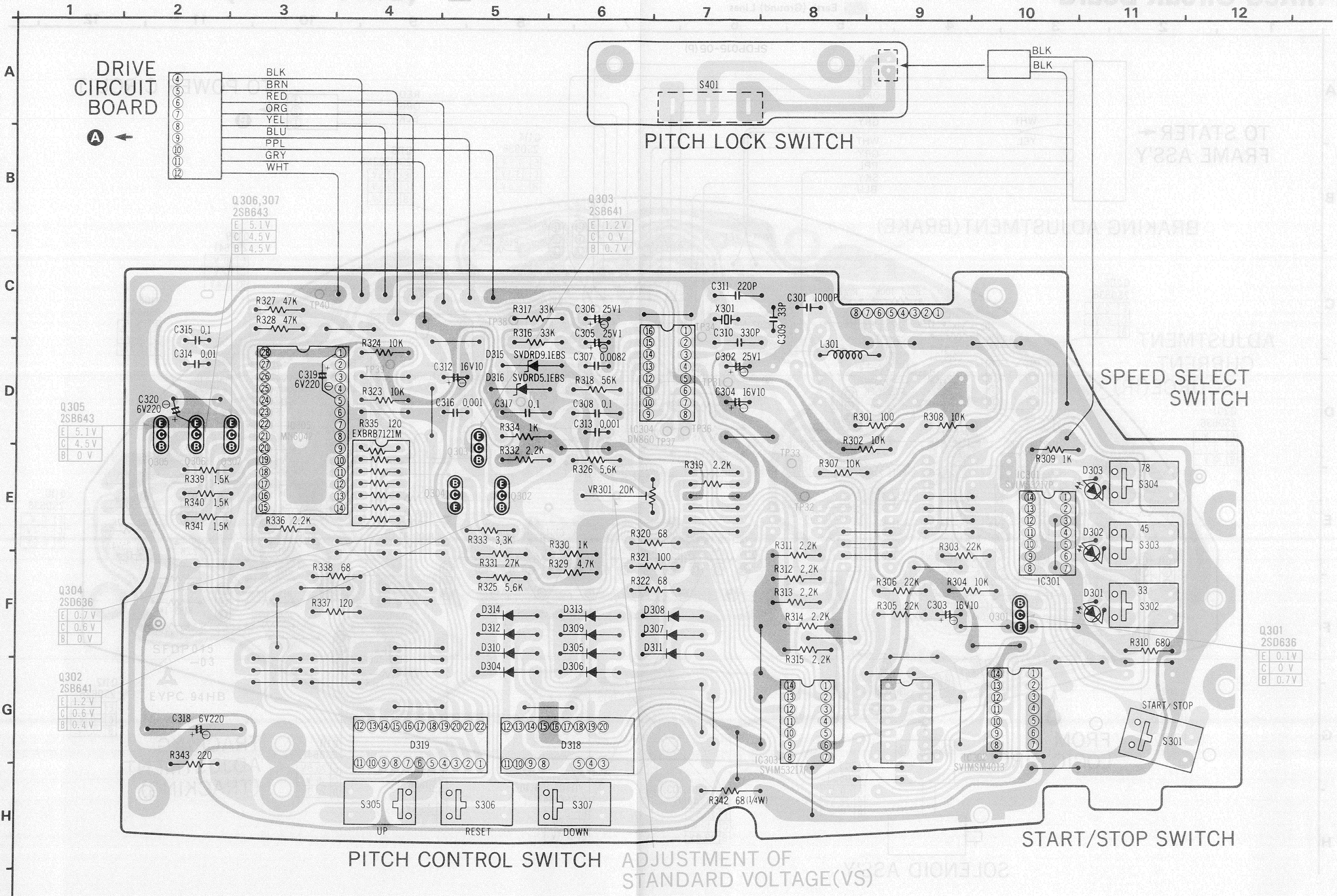
▨ ⊕ B Lines
Earth (Ground) Lines

(Logic Circuit)


1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H
DRIVE CIRCUIT BOARD
Ⓐ ←
④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫
BLK
BRN
RED
ORG
YEL
BLU
PPL
GRY
WHT
PITCH LOCK SWITCH
S401
BLK
BLK
SPEED SELECT SWITCH
START/STOP SWITCH
PITCH CONTROL SWITCH
ADJUSTMENT OF STANDARD VOLTAGE(VS)
Q306,307 2SB643
E 5.1V
C 4.5V
B 4.5V
Q303 2SB641
E 1.2V
C 0V
B 0.7V
Q305 2SB643
E 5.1V
C 4.5V
B 0V
Q304 2SD636
E 0.7V
C 0.6V
B 0V
Q302 2SB641
E 1.2V
C 0.6V
B 0.4V
Q301 2SD636
E 0.1V
C 0V
B 0.7V
R327 47K
R328 47K
TP40
C315 0.1
C314 0.01
C316 6V220
IC305 MN6042
R324 10K
R323
TP39
R335 120
EXBRB7121M
C312 16V10
C318 0.001
R317 33K
R316 33K
TP38
C306 25V1
C305 25V1
C307 0.0082
D315 SVDRD9.1EBS
D316
C317
R318 56K
C308 0.1
C313 0.001
R334
R332
R326 5.6K
VR301 20K
IC304 DN860
TP37 TP36
C311 220P
C309
C301 1000P
X301
C310 330P
C302 25V1
C304 16V10
TP34 TP31
L301
R301 100
R302 10K
R308 10K
R307 10K
TP33
TP32
R319 2.2K
R339 1.5K
R340 1.5K
R341 1.5K
R336 2.2K
R333 3.3K
R330
R331 27K
R329
R325 5.6K
R338 68
R337 120
R320 68
R321 100
R322 68
D314 D313 D308
D312 D309 D307
D310 D305 D311
D304 D306
R311 2.2K
R312 2.2K
R313 2.2K
R314 2.2K
R315 2.2K
R303 22K
R306 22K
R304 10K
R305 22K
C303 16V10
R309 1K
IC301 SVIM53217P
IC301
D303 78 S304
D302 45 S303
D301 33 S302
R310 680
Q301 Q302 Q303 Q304 Q305 Q306 Q307
C319 6V220
R343 220
D319
D318
IC303 SVIM53217P
IC302 SVIMSM4013
R342 68(1/4W)
START/STOP S301
S305 UP
S306 RESET
S307 DOWN

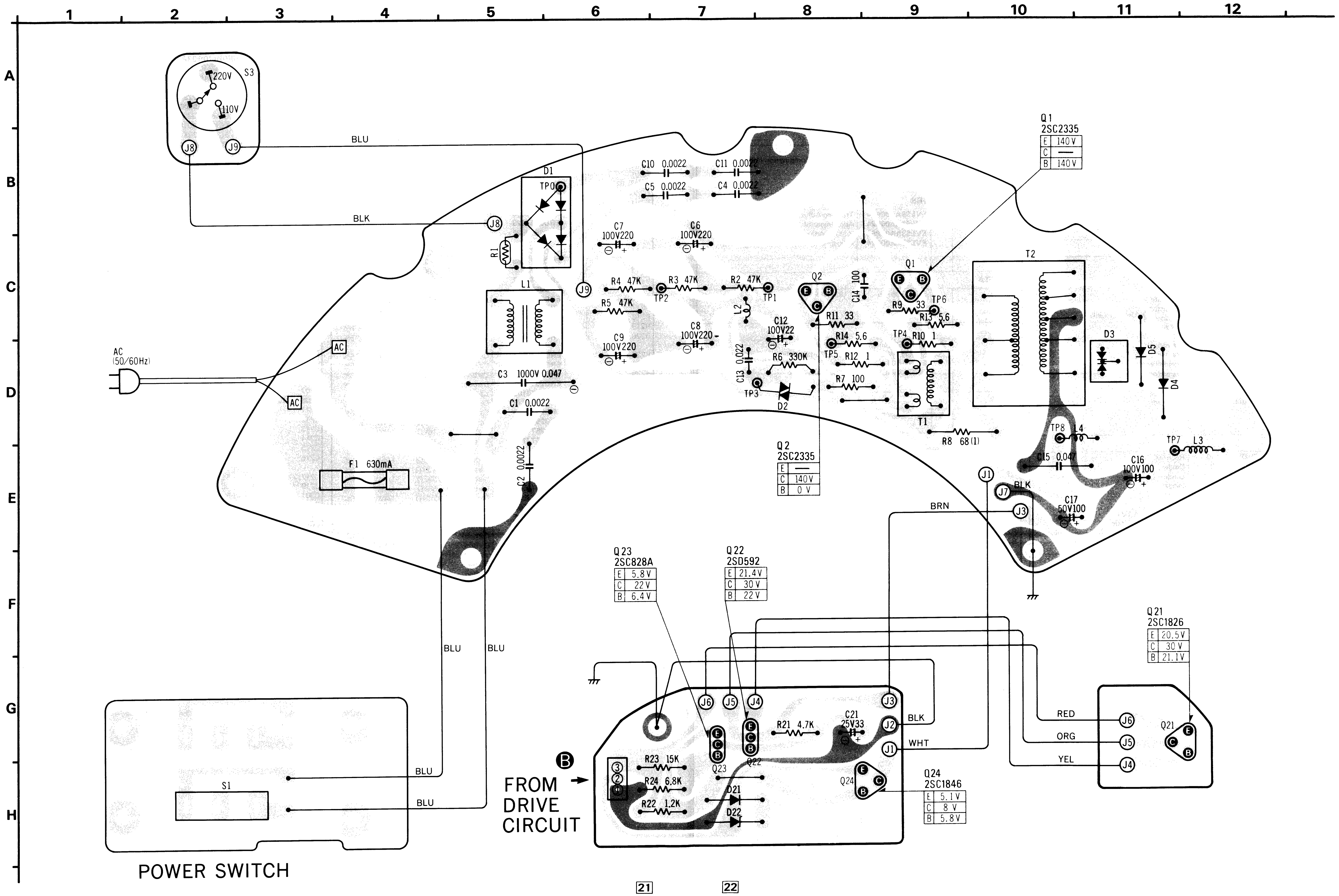
Printed Circuit Board (Logic Circuit)

▨ ⊕ B Lines
▨ Earth (Ground) Lines


1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D
E
F
G
H
DRIVE CIRCUIT BOARD
Ⓐ ←
④ BLK
⑤ BRN
⑥ RED
⑦ ORG
⑧ YEL
⑨ BLU
⑩ PPL
⑪ GRY
⑫ WHT
S401
PITCH LOCK SWITCH
BLK
BLK
Q306,307 2SB643
E 5.1V
C 4.5V
B 4.5V
Q303 2SB641
E 1.2V
C 0V
B 0.7V
Q305 2SB643
E 5.1V
C 4.5V
B 0V
Q304 2SD636
E 0.7V
C 0.6V
B 0V
Q302 2SB641
E 1.2V
C 0.6V
B 0.4V
Q301 2SD636
E 0.1V
C 0V
B 0.7V
R327 47K
R328 47K
C315 0.1
C314 0.01
C320 6V220
C319 6V220
IC305 MN6042
R324 10K
R323 10K
R335 120
EXBRB7121M
R317 33K
R316 33K
C306 25V1
C305 25V1
C312 16V10
D315 SVDRD9.1EBS
D316 SVDRD5.1EBS
C307 0.0082
R318 56K
C316 0.001
C317 0.1
C308 0.1
C313 0.001
R334 1K
R332 2.2K
R326 5.6K
IC304 DN860
C311 220P
X301
C310 330P
C309 33P
C301 1000P
C302 25V1
C304 16V10
L301
SPEED SELECT SWITCH
R301 100
R308 10K
R302 10K
R307 10K
R309 1K
R319 2.2K
VR301 20K
IC301 SVIM53217P
D303
78
S304
D302
45
S303
D301
33
S302
R339 1.5K
R340 1.5K
R341 1.5K
R336 2.2K
R333 3.3K
R331 27K
R325 5.6K
R330 1K
R329 4.7K
R320 68
R321 100
R322 68
R338 68
R337 120
R311 2.2K
R312 2.2K
R313 2.2K
R314 2.2K
R315 2.2K
R303 22K
R306 22K
R304 10K
R305 22K
C303 16V10
R310 680
D314
D312
D310
D304
D313
D309
D305
D306
D308
D307
D311
C318 6V220
R343 220
D319
D318
IC303 SVIM53217P
IC302 SVIMSM4013
START/STOP
S301
R342 68(1/4W)
S305
UP
S306
RESET
S307
DOWN
TP31
TP32
TP33
TP36
TP37
TP38
TP39
TP40
SFDP015-03
EYPC 94HB
PITCH CONTROL SWITCH
ADJUSTMENT OF STANDARD VOLTAGE(VS)
START/STOP SWITCH

Printed Circuit Board (Power Circuit)

▨ Earth (Ground) Lines


1
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3
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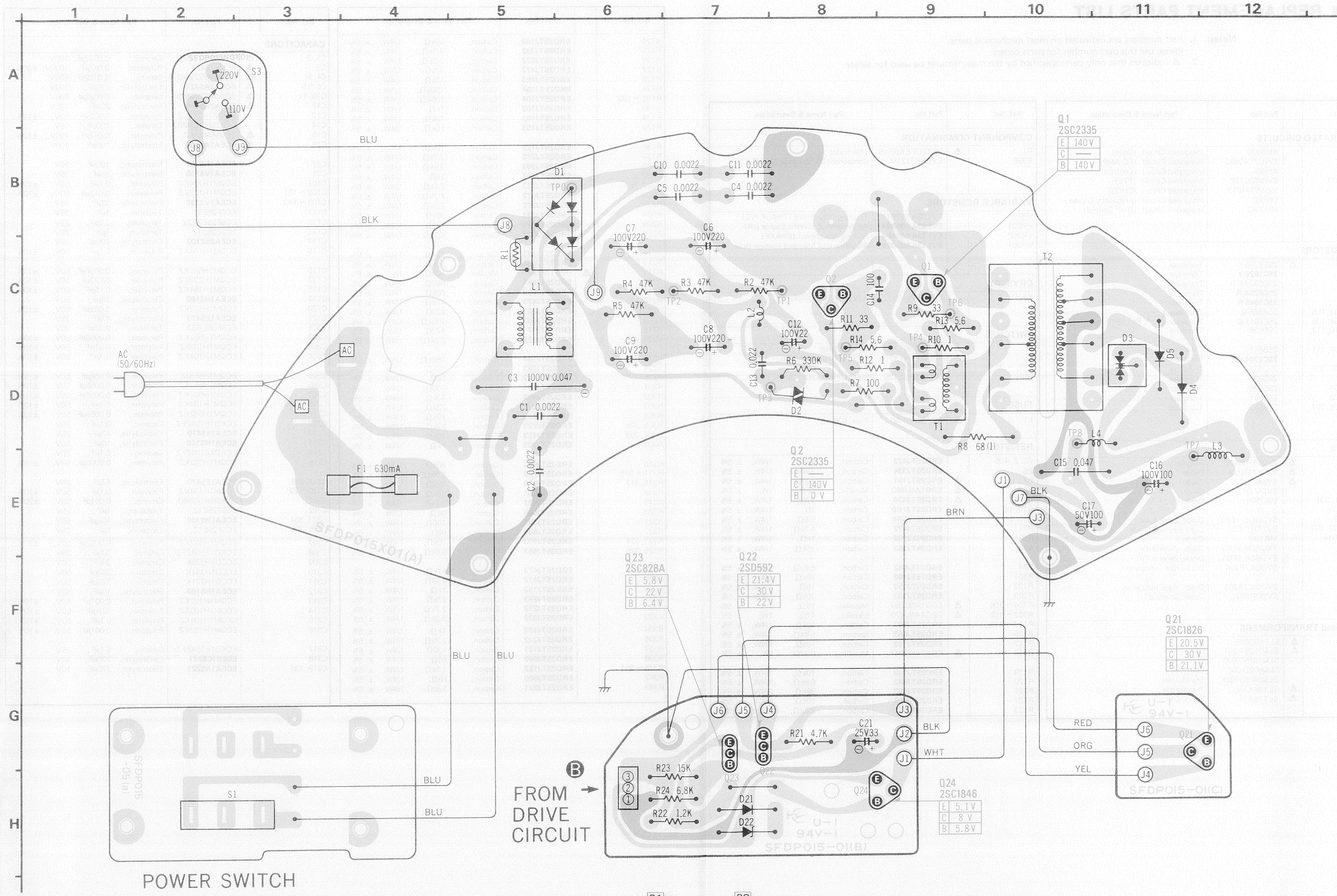
11
12
A
B
C
D
E
F
G
H
S3
220V
110V
J8
J9
BLU
BLK
D1
TP0
R1
J8
J9
L1
AC
(50/60Hz)
AC
AC
C10 0.0022
C11 0.0022
C5 0.0022
C4 0.0022
C7 100V220
C6 100V220
R4 47K
R3 47K
R2 47K
TP2
TP1
R5 47K
L2
C9 100V220
C8 100V220
C12 100V22
C13 0.022
R6 330K
TP3
D2
C3 1000V 0.047
C1 0.0022
C2 0.0022
F1 630mA
Q2
C14 100
Q1
R11 33
R9 33
TP6
R13 5.6
R14 5.6
TP4
R10 1
TP5
R12 1
R7 100
T1
R8 68(1)
T2
D3
D5
D4
TP8
L4
TP7
L3
C15 0.047
C16 100V100
C17 50V100
J1
J7
BLK
J3
BRN
Q1
2SC2335
E 140V
C —
B 140V
Q2
2SC2335
E —
C 140V
B 0V
Q23
2SC828A
E 5.8V
C 22V
B 6.4V
Q22
2SD592
E 21.4V
C 30V
B 22V
Q21
2SC1826
E 20.5V
C 30V
B 21.1V
Q24
2SC1846
E 5.1V
C 8V
B 5.8V
BLU
BLU
J6
J5
J4
J3
J2
J1
BLK
WHT
R21 4.7K
C21 25V33
R23 15K
R24 6.8K
R22 1.2K
D21
D22
Q23
Q22
Q24
3
2
1
B
FROM DRIVE CIRCUIT
RED
ORG
YEL
J6
J5
J4
Q21
E
C
B
S1
BLU
BLU
POWER SWITCH

Printed Circuit Board (Power Circuit)

▨ Earth (Ground) Lines


1
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10
11
12
A
B
C
D
E
F
G
H
S3
220V
110V
J8
J9
BLU
BLK
D1
TP0
R1
C10 0.0022
C11 0.0022
C5 0.0022
C4 0.0022
C7 100V220
C6 100V220
R4 47K
R3 47K
R2 47K
R5 47K
TP1
TP2
L1
L2
C9 100V220
C8 100V220
C12 100V22
C13 0.022
R6 330K
TP3
D2
Q2
C14 100
R11 33
R14 5.6
TP5
R12 1
R7 100
Q1
R9 33
TP6
R13 5.6
TP4
R10 1
T1
R8 68 (1)
T2
D3
D5
D4
TP8
L4
TP7
L3
C15 0.047
C16 100V100
C17 50V100
Q1
2SC2335
E 140V
C —
B 140V
Q2
2SC2335
E —
C 140V
B 0 V
AC
AC (50/60Hz)
C3 1000V 0.047
C1 0.0022
C2 0.0022
F1 630mA
SFDP015X01(A)
J1
J7
BLK
J3
BRN
Q23
2SC828A
E 5.8V
C 22V
B 6.4V
Q22
2SD592
E 21.4V
C 30V
B 22V
Q21
2SC1826
E 20.5V
C 30 V
B 21.1V
BLU
BLU
SFDP015-05(a)
S1
BLU
BLU
J6
J5
J4
J3
J2
J1
BLK
WHT
R21 4.7K
C21 25V33
B
FROM DRIVE CIRCUIT
3
2
1
R23 15K
R24 6.8K
R22 1.2K
Q23
Q22
D21
D22
Q24
Q24
2SC1846
E 5.1V
C 8 V
B 5.8V
U-1 94V-1
SFDP015-01(B)
RED
ORG
YEL
J6
J5
J4
Q21
U-1 94V-1
SFDP015-01(C)
POWER SWITCH

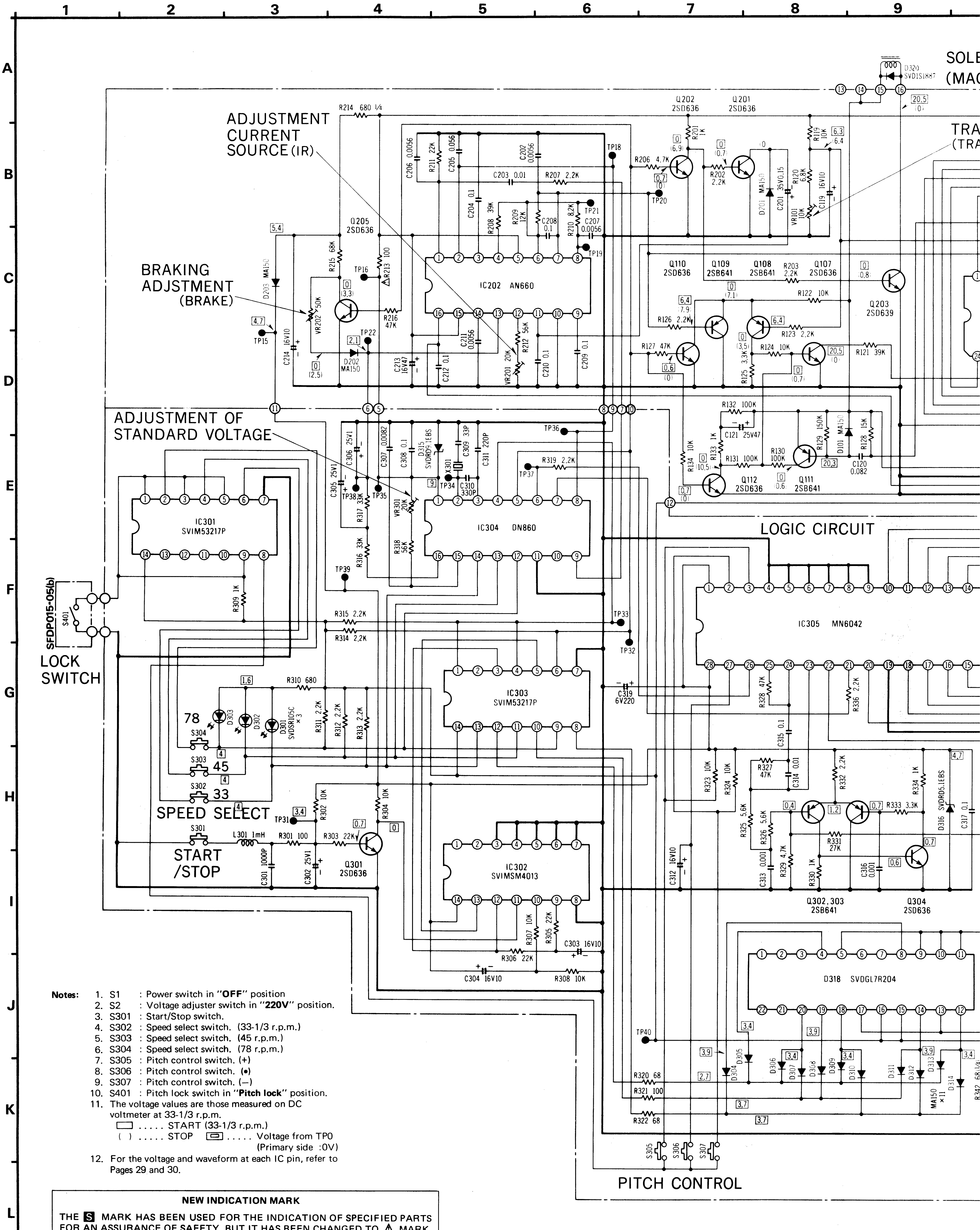
■ REPLACEMENT PARTS LIST

Notes: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.
2. ⚠ indicates that only parts specified by the manufacturer be used for safety.

Ref. No.		Part No.	Part Name & Description
INTEGRATED CIRCUITS			
IC101		AN640G	Integrated Circuit (Drive)
IC201		SVIUPC4558C	Integrated Circuit (FG AMP)
IC202		AN660	Integrated Circuit (Control)
IC301, 303		SVIM53217P	Integrated Circuit (TTL)
IC302		SVIMSM4013	Integrated Circuit (CMOS)
IC304		DN860	Integrated Circuit (Frequency Divider)
IC305		MN6042	Integrated Circuit (Pitch Control)
TRANSISTORS			
Q1, 2	⚠	2SC2335-K	Transistor
Q21		**2SC1826-Y**	Transistor
Q22		2SD592AE-R	Transistor
Q23		**2SC828A-R**	Transistor
Q24		**2SC1846-R**	Transistor
Q101, 103, 105		2SA886-Q	Transistor } Use pair ranks
Q102, 104, 106		2SC1847-Q	Transistor } Use pair ranks
Q107, 110, 112, 114		2SD636	Transistor
Q108, 109, 111		2SB641	Transistor
Q113		**2SC1384A-R**	Transistor
Q201, 202, 205		2SD636	Transistor
Q203		2SD639	Transistor
Q301, 304		2SD636	Transistor
Q302, 303		2SB641	Transistor
Q305, 306, 307		2SB643	Transistor
DIODES			
D1	⚠	SVDS1RBA40	Rectifier
D2	⚠	SVDS1S2093	Diode
D3	⚠	SVDCTU22S	Diode
D4, 5		SVDV19C	Diode
D21, 101, 201 202, 203		MA150	Diode
D22, 102		SVDRD5, 1EBS	Diode, Zener 5.1V
D301, 302, 303		SVDSR105C	Light Emitting Diode
D304 ~ 314		MA150	Diode
D315		SVDRD9.1EBS	Diode, Zener 9.1V
D316		SVDRD5.1EBS	Diode, Zener 5.1V
D318		SVDGL7R204	Diode, rpm Indication
D319		SVDGL7R203	Diode, Pitch Indication
D320		SVDIS1887	Diode, Solenoid
COILS and TRANSFORMERS			
L1	⚠	ELF18D305	Filter
L2	⚠	SLQ1025T-201	Coil
L3		SLQ1016D-800	Coil
L4		SLQ809D-300	Coil
L301		SLQ0406S102K	Transformer
T1	⚠	SLT35K1A	Transformer
T2	⚠	SLT12K7A	Chock Coil
COMPONENT COMBINATION			
R1	⚠	ERTD3FEK8R0S	Thermistor
R335		EXBRB7121M	Component Combination (120Ω x 7)
VARIABLE RESISTORS			
VR101		**EVLS3AA00B14**	Tracking Adjustment (TRACKING)
VR201		**EVLS3AA00B24**	Adjustment of Current Source (IR)
VR202		**EVLS3AA00B54**	Braking Adjustment (BRAKE)
VR301		**EVLS3AA00B24**	Adjustment of Standard Voltage (VS)
CRYSTAL			
X301		SVQU306115	4.19328MHz Oscillator
SWITCHES			
S1	⚠	SFDSSS5GL132	Switch, Power
S2	⚠	SFDSHXW13312	Switch, Voltage Adjuster
S301 ~ 307		EVQP1R04K	Switch
S401		SFDSSS5GL13C	Switch, Pitch Lock
FUSE			
F1	⚠	XBA2C06TR0	Fuse, 630mA
RESISTORS			
R2, 3, 4, 5		**ERD25TJ473**	Carbon, 47kΩ, 1/4W, ± 5%
R6		**ERD25TJ334**	Carbon, 330kΩ, 1/4W, ± 5%
R7	⚠	**ERD25TJ101**	Carbon, 100Ω, 1/4W, ± 5%
R8	⚠	**ERG1ANJ680**	Metallic, 68Ω, 1W, ± 5%
R9, 11	⚠	**ERD25TJ330**	Carbon, 33Ω, 1/4W, ± 5%
R10, 12		**ERD25TJ1R0**	Carbon, 1Ω, 1/4W, ± 5%
R13, 14		**ERD25TJ5R6**	Carbon, 5.6Ω, 1/4W, ± 5%
R21		**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%
R22		**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%
R23		**ERD25TJ153**	Carbon, 15kΩ, 1/4W, ± 5%
R24		**ERD25TJ682**	Carbon, 6.8kΩ, 1/4W, ± 5%
R101		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R102		**ERD25TJ150**	Carbon, 15Ω, 1/4W, ± 5%
R103		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R104 ~ 106	⚠	ERG1ANJ150	Metallic, 15Ω, 1W, ± 5%
R107 ~ 109	⚠	ERG1ANJ470	Metallic, 47Ω, 1W, ± 5%
R110 ~ 115		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R116		**ERD25TJ562**	Carbon, 5.6kΩ, 1/4W, ± 5%
R117		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R118	⚠	ERX1ANJR47	Metallic, 0.47Ω, 1W, ± 5%
R119		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R120		**ERD25TJ682**	Carbon, 6.8kΩ, 1/4W, ± 5%
R121		**ERD25TJ393**	Carbon, 39kΩ, 1/4W, ± 5%
R122		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R123		**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%
R124		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R125		**ERD25TJ332**	Carbon, 3.3kΩ, 1/4W, ± 5%
R126		**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%
R127		**ERD25TJ473**	Carbon, 47kΩ, 1/4W, ± 5%
R128		**ERD25TJ153**	Carbon, 15kΩ, 1/4W, ± 5%
R129		**ERD25TJ154**	Carbon, 150kΩ, 1/4W, ± 5%
R130 ~ 132		**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ± 5%
R133		**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%
R134		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R135		**ERD25TJ153**	Carbon, 15kΩ, 1/4W, ± 5%
R136		**ERD25TJ123**	Carbon, 12kΩ, 1/4W, ± 5%
R137		**ERD25TJ272**	Carbon, 2.7kΩ, 1/4W, ± 5%
R138		**ERD25TJ392**	Carbon, 3.9kΩ, 1/4W, ± 5%
R201		**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%
R202, 203		**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%
R206		**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%
R207		**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%
R208		**ERD25TJ393**	Carbon, 39kΩ, 1/4W, ± 5%
R209		**ERD25TJ123**	Carbon, 12kΩ, 1/4W, ± 5%
R210		**ERD25TJ822**	Carbon, 8.2kΩ, 1/4W, ± 5%
R211		**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%
R212		**ERD25TJ563**	Carbon, 56kΩ, 1/4W, ± 5%
R213	⚠	ERG1ANJ101	Metallic, 100Ω, 1W, ± 5%
R214		**ERD25TJ681**	Carbon, 680Ω, 1/4W, ± 5%
R215		**ERD25TJ683**	Carbon, 68kΩ, 1/4W, ± 5%
R216		**ERD25TJ473**	Carbon, 47kΩ, 1/4W, ± 5%
R217		**ERD25TJ221**	Carbon, 220Ω, 1/4W, ± 5%
R218		**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ± 5%
R219		**ERD25TJ471**	Carbon, 470Ω, 1/4W, ± 5%
R220, 221		**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%
R222, 223		**ERD25TJ184**	Carbon, 180kΩ, 1/4W, ± 5%
R224		**ERD25TJ393**	Carbon, 39kΩ, 1/4W, ± 5%
R225		**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%
R301		**ERD25TJ101**	Carbon, 100Ω, 1/4W, ± 5%
R302		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R303		**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%
R304		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R305, 306		**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%
R307, 308		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R309		**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%
R310		**ERD25TJ681**	Carbon, 680Ω, 1/4W, ± 5%
R311 ~ 315		**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%
R316, 317		**ERD25TJ333**	Carbon, 33kΩ, 1/4W, ± 5%
R318		**ERD25TJ563**	Carbon, 56kΩ, 1/4W, ± 5%
R319		**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%
R320		**ERD25TJ680**	Carbon, 68Ω, 1/4W, ± 5%
R321		**ERD25TJ101**	Carbon, 100Ω, 1/4W, ± 5%
R322		**ERD25TJ680**	Carbon, 68Ω, 1/4W, ± 5%
R323, 324		**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%
R325, 326		**ERD25TJ562**	Carbon, 5.6kΩ, 1/4W, ± 5%
R327, 328		**ERD25TJ473**	Carbon, 47kΩ, 1/4W, ± 5%
R329		**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%
R330		**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%
R331		**ERD25TJ273**	Carbon, 27kΩ, 1/4W, ± 5%
R332		**ERD25TJ272**	Carbon, 2.7kΩ, 1/4W, ± 5%
R333		**ERD25TJ332**	Carbon, 3.3kΩ, 1/4W, ± 5%
R334		**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%
R336		**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%
R337		**ERD25TJ121**	Carbon, 120Ω, 1/4W, ± 5%
R338		**ERD25TJ680**	Carbon, 68Ω, 1/4W, ± 5%
R339 ~ 341		**ERD25TJ152**	Carbon, 1.5kΩ, 1/4W, ± 5%
R342		**ERD25TJ680**	Carbon, 68Ω, 1/4W, ± 5%
R343		**ERD25TJ221**	Carbon, 220Ω, 1/4W, ± 5%
CAPACITORS			
C1, 2	⚠	ECKDHS222MD	Ceramic, 0.0022μF, 400V
C3	⚠	ECQE10473	Polyester, 0.047μF, 1000V, ±20%
C4, 5	⚠	ECKDHS222MD	Ceramic, 0.0022μF, 400V
C6 ~ 9	⚠	**ECEA2AS221**	Electrolytic, 220μF, 100V
C10, 11	⚠	ECKDHS222MD	Ceramic, 0.0022μF, 400V
C12	⚠	**ECEA2AS200**	Electrolytic, 22μF, 100V
C13		ECQM1H223KZ	Polyester, 0.022μF, 50V, ±10%
C14		ECKD3A101MB2	Ceramic, 100pF, 10V
C15	⚠	ECQM4473KZ	Polyester, 0.047μF, 400V, ±10%
C16	⚠	**ECEA2AS101**	Electrolytic, 100μF, 100V
C17		**ECEA1HS101**	Electrolytic, 100μF, 16V
C21		**ECEA1VS330**	Electrolytic, 33μF, 35V
C101		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C102 ~ 107		ECQM1H123KZ	Polyester, 0.012μF, 50V, ±10%
C108 ~ 110		**ECEA1VS330**	Electrolytic 33μF, 35V
C111		ECSF25E1Z	Tantalum, 1μF, 25V
C112		ECSF25E2R2Z	Tantalum, 2.2μF, 25V
C113		ECSF25E1Z	Tantalum, 1μF, 25V
C114		**ECEA25Z100**	Electrolytic, 100μF, 25V
C115		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C116		ECQM1H562KZ	Polyester, 0.0056μF, 50V, ±10%
C117		ECQM1H223KZ	Polyester, 0.022μF, 50V, ±10%
C118		ECQM1H154KZ	Polyester, 0.15μF, 50V, ±10%
C119		**ECEA1HS100**	Electrolytic, 10μF, 50V
C120		ECQM1H823KZ	Polyester, 0.082μF, 50V, ±10%
C121		**ECEA1ES470**	Electrolytic, 47μF, 25V
C201		ECSF35ER33	Tantalum, 0.33μF, 35V
C202		ECQM1H562KZ	Polyester, 0.0056μF, 50V, ±10%
C203		ECQM1H103KZ	Polyester, 0.01μF, 50V, ±10%
C204		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C205		ECQM1H563JZ	Polyester, 0.056μF, 50V, ± 5%
C206		ECQM1H562KZ	Polyester, 0.0056μF, 50V, ±10%
C207		ECQM1H562KZ	Polyester, 0.0056μF, 50V, ±10%
C208 ~ 210		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C211		ECQM1H562KZ	Polyester, 0.0056μF, 50V, ±10%
C212		ECKD1E104ZFZ	Ceramic, 0.1μF, 25V
C213		**ECEA1ES470**	Electrolytic, 47μF, 25V
C214		**ECEA1HS100**	Electrolytic, 10μF, 50V
C215		ECKD1E104ZFZ	Ceramic, 0.1μF, 25V
C216		ECQM1H562KZ	Polyester, 0.0056μF, 50V, ±10%
C217, 218		ECEA1ES470	Electrolytic, 47μF, 25V
C219 ~ 221		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C301		ECKD1H102MD	Ceramic, 0.001μF, 50V, ±20%
C302		ECSF25E1Z	Tantalum, 1μF, 25V
C303, 304		**ECEA1HS100**	Electrolytic, 100μF, 50V
C305, 306		ECSF25E1Z	Tantalum, 1μF, 25V
C307		ECQM1H822KZ	Polyester, 0.0082μF, 50V, ±10%
C308		ECKD1E104ZFZ	Ceramic, 0.1μF, 25V
C309		ECCD1H330K	Ceramic, 33pF, 50V
C310		ECCD1H331K	Ceramic, 330pF, 50V
C311		ECCD1H221K	Ceramic, 220pF, 50V
C312		**ECEA1HS100**	Electrolytic, 10μF, 50V
C313		ECQM1H102KZ	Polyester, 0.001μF, 50V, ±10%
C314		ECQM1H103KZ	Polyester, 0.01μF, 50V, ±10%
C315		CEQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C316		ECQM1H102KZ	Polyester, 0.001μF, 50V, ±10%
C317		ECKD1E104ZFZ	Ceramic, 0.1μF, 25V
C318		**ECEB1CS221**	Electrolytic, 220μF, 10V
C319, 320		**ECEA1AS221**	Electrolytic, 220μF, 10V

Schematic Diagram

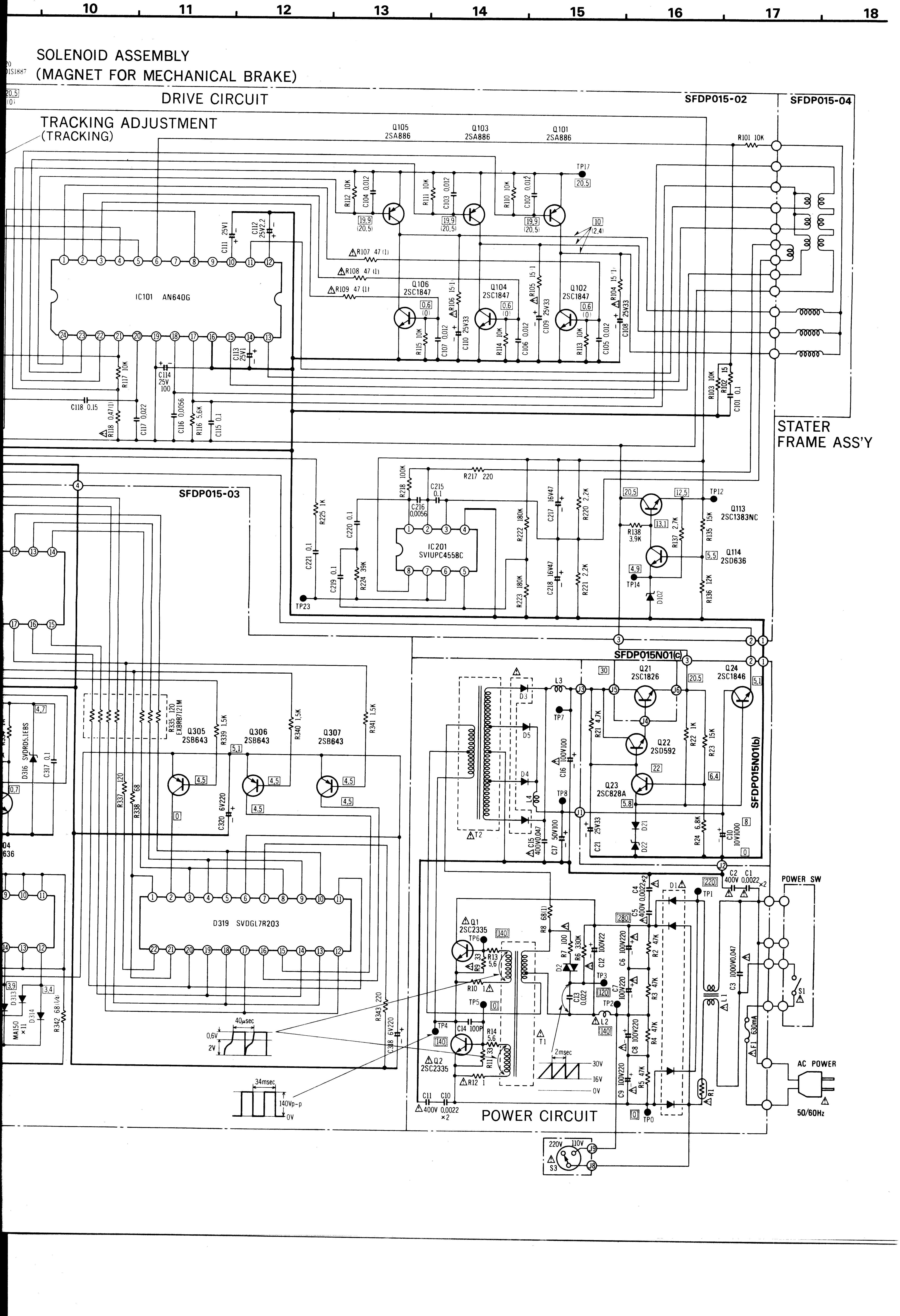
(This schematic diagram may be at any time with the development of new technology)


1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
G
H
I
J
K
L
SOLE
(MAC
TRA
(TRA
D320 SVD1S1887
ADJUSTMENT CURRENT SOURCE (IR)
BRAKING ADJSTMENT (BRAKE)
ADJUSTMENT OF STANDARD VOLTAGE
IC202 AN660
IC301 SVIM53217P
IC304 DN860
IC303 SVIM53217P
IC302 SVIMSM4013
IC305 MN6042
D318 SVDGL7R204
LOGIC CIRCUIT
Q205 2SD636
Q202 2SD636
Q201 2SD636
Q110 2SD636
Q109 2SB641
Q108 2SB641
Q107 2SD636
Q203 2SD639
Q112 2SD636
Q111 2SB641
Q301 2SD636
Q302, 303 2SB641
Q304 2SD636
R214 680 1/4
R215 68K
R213 100
R216 47K
VR202 50K
D203 MA150
D202 MA150
C214 16V10
C213 16V47
TP15
TP16
TP22
TP18
TP19
TP20
TP21
TP31
TP32
TP33
TP34
TP35
TP36
TP37
TP38
TP39
TP40
SFDP015-05(b)
S401
LOCK SWITCH
78
S304
S303
45
S302
33
SPEED SELECT
S301
START /STOP
L301 1mH
D301 SVDSR105C ×3
D302
D303
X301
VR301 20K
VR201 20K
VR101 10K
S305
S306
S307
PITCH CONTROL
MA150 ×11

Notes:
1. S1 : Power switch in "**OFF**" position
2. S2 : Voltage adjuster switch in "**220V**" position.
3. S301 : Start/Stop switch.
4. S302 : Speed select switch. (33-1/3 r.p.m.)
5. S303 : Speed select switch. (45 r.p.m.)
6. S304 : Speed select switch. (78 r.p.m.)
7. S305 : Pitch control switch. (+)
8. S306 : Pitch control switch. (•)
9. S307 : Pitch control switch. (−)
10. S401 : Pitch lock switch in "**Pitch lock**" position.
11. The voltage values are those measured on DC voltmeter at 33-1/3 r.p.m.
    ☐ ..... START (33-1/3 r.p.m.)
    ( ) ..... STOP ⊟ ..... Voltage from TPO (Primary side :0V)
12. For the voltage and waveform at each IC pin, refer to Pages 29 and 30.

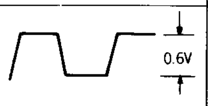
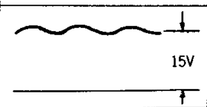
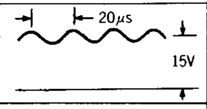
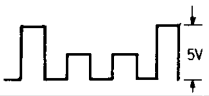
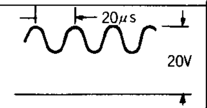
NEW INDICATION MARK

THE **S** MARK HAS BEEN USED FOR THE INDICATION OF SPECIFIED PARTS FOR AN ASSURANCE OF SAFETY, BUT IT HAS BEEN CHANGED TO ⚠ MARK. WHEN REPLACING PARTS, BE SURE TO USE PARTS WITH CORRECT NUMBERS WITH REFERENCE TO THE SCHEMATIC DIAGRAM OR THE REPAIR PARTS LIST.

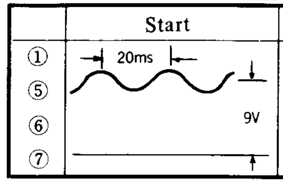

10
11
12
13
14
15
16
17
18
SOLENOID ASSEMBLY
(MAGNET FOR MECHANICAL BRAKE)
DRIVE CIRCUIT
SFDP015-02
SFDP015-04
TRACKING ADJUSTMENT
(TRACKING)
Q105 2SA886
Q103 2SA886
Q101 2SA886
R101 10K
TP17
IC101 AN640G
C111 25V1
C112 25V2.2
R107 47 (1)
R108 47 (1)
R109 47 (1)
Q106 2SC1847
Q104 2SC1847
Q102 2SC1847
R112 10K
C104 0.012
R111 10K
C103 0.012
R110 10K
C102 0.012
R106 15(1)
R105 15(1)
R104 15(1)
C110 25V33
C109 25V33
C108 25V33
R115 10K
C107 0.012
R114 10K
C106 0.012
R113 10K
C105 0.012
C113 25V1
C114 25V 100
R117 10K
C118 0.15
R118 0.47(1)
C117 0.022
C116 0.0056
R116 5.6K
C115 0.1
R103 10K
R102 15
C101 0.1
STATER FRAME ASS'Y
SFDP015-03
R217 220
R218 100K
C215 0.1
C216 0.0056
C220 0.1
R225 1K
IC201 SVIUPC4558C
C221 0.1
C219 0.1
R224 39K
TP23
R222 180K
R223 180K
C217 16V47
C218 16V47
R220 2.2K
R221 2.2K
TP12
Q113 2SC1383NC
Q114 2SD636
R138 3.9K
R137 2.7K
R135 15K
R136 12K
TP14
D102
SFDP015N01(c)
Q21 2SC1826
Q24 2SC1846
Q22 2SD592
Q23 2SC828A
R21 4.7K
R22 1K
R23 15K
R24 6.8K
C21 25V33
D21
D22
C10 10V1000
SFDP015N01(b)
L3
D3
D5
D4
L4
TP7
TP8
C16 100V100
C15 400V0.047
C17 50V100
T2
R335 120 EXBR8121M
R339 1.5K
R340 1.5K
R341 1.5K
Q305 2SB643
Q306 2SB643
Q307 2SB643
R337 120
R338 68
C320 6V220
D316 SVDRD5.1EBS
C317 0.1
D319 SVDGL7R203
D313
D314
MA150 ×11
R342 68(1/4)
R343 220
C318 6V220
40μsec
0.6V
2V
34msec
140Vp-p
0V
Q1 2SC2335
Q2 2SC2335
TP6
TP5
TP4
R9 33
R13 5.6
R10 1
R14 5.6
R11 33
R12 1
C14 100P
R8 68(1)
R7 100
R6 330K
D2
C12 100V22
C13 0.022
TP3
TP2
L2
T1
2msec
30V
16V
0V
C6 100V220
C7 100V220
C8 100V220
C9 100V220
R2 47K
R3 47K
R4 47K
R5 47K
C4 400V 0.0022×2
C5
D1
TP1
C2 400V
C1 0.0022 ×2
C3 100V0.047
L1
R1
F1 630mA
S1
POWER SW
AC POWER
50/60Hz
C11 400V
C10 0.0022 ×2
POWER CIRCUIT
TP0
220V 110V
S3
J1
J2
J3
J4
J5
J6
J8
J9

■ REFERENCE VOLTAGE AND WAVEFORM AT EACH IC PIN

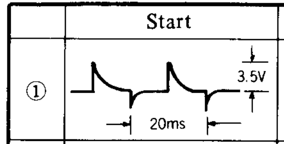
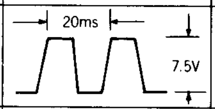
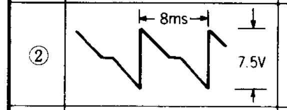
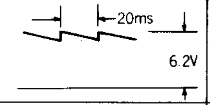
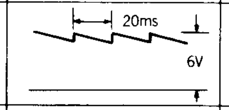
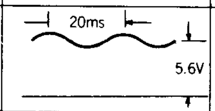
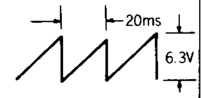
IC101 (AN640G)

	Start	Stop		Start	Stop		Start	Stop
① ② ③		0 V	⑩ ⑫ ⑭		15 V	⑲	20.5V	20.5V
						⑳	15.4V	1.4V
						㉑	20.6V	16.4V
④	6.3V	6.4V	⑪ ⑬ ⑮		Same as at left	㉒ ㉓ ㉔	19.9V	20.5V
⑤	6.3V	7.9V						
⑥	4.8V	2.2V						
⑦	5 V	5 V	⑯	0V	0 V			
⑧	20.5V	20.5V	⑰	15.5V	15.5V			
⑨		0.2V	⑱		Same as at left			

IC201 (SVIUPC4558C)

	Start	Stop		Start	Stop
① ⑤ ⑥ ⑦		9V	② ③	9 V	9 V
			④	0 V	0 V
			⑧	17.6V	17.6V

IC202 (AN660)

	Start	Stop		Start	Stop		Start	Stop
①		0 V	⑤	12.6V	Same as at left	⑫	2.4V	2.1V
			⑥	6.3V		⑬	2.2V	2.1V
			⑦	6.5V	8 V	⑭		7.5V
②		0 V	⑧	6.3V	5.1V			
			⑨		7.5V	⑮	12.5V	12.5V
③		5.8V	⑩	0 V	0 V	⑯		5.6V
④	5.8V	6 V	⑪		7.5V			

IC301 (SVIM53217P)

	Start	Stop
①	0.2V	0.2V
②	0 V	0 V
③	0.2V	0.2V
④	0 V	0 V
⑤	0.2V	0.2V
⑥ ⑦ ⑧	0 V	0 V
⑨	0.2V	0.2V
⑭	5.1V	5.1V

IC302 (SVIMSM4013)

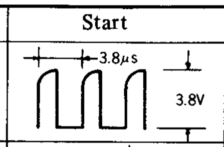
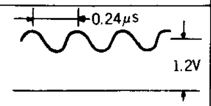
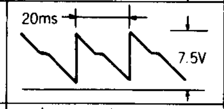
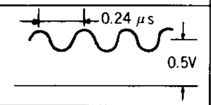
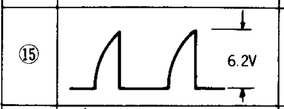
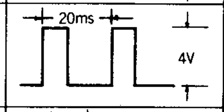
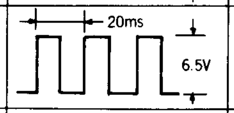
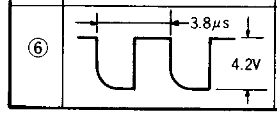
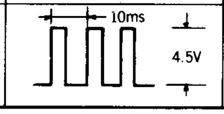
	Start	Stop
③ ④ ⑤ ⑥ ⑦ ⑧	0 V	0 V
⑨	0 V	4.7V
⑩ ⑪	0 V	0 V
⑫	0 V	4.7V
⑬	4.7V	0 V
⑭	4.7V	4.7V

IC303 (SVIM53217P)

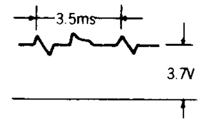
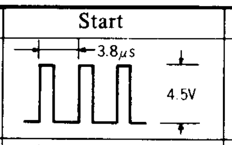
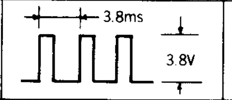
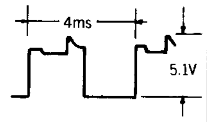
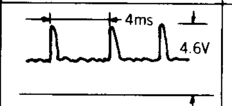
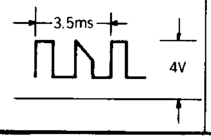
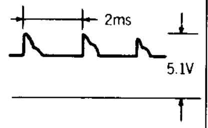
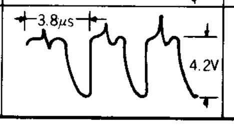
	Start	Stop
①	0.1V	4.2V
③	0 V	4.7V
④	0.1V	4.2V
⑤	4.7V	0 V
⑥	3.2V	0 V
⑦	0 V	0 V
⑧	3.8V	3.8V
⑨	4 V	4 V
⑩	3.8V	3.8V
⑪	4 V	4 V
⑫	0.4V	0.4V
⑬	0 V	0 V
⑭	5.1V	5.1V

■ REFERENCE VOLTAGE AND WAVEFORM AT EACH IC PIN

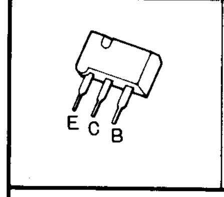
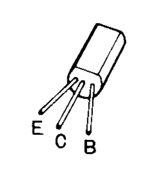
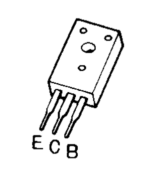
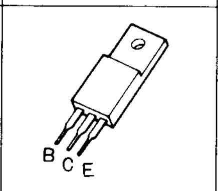
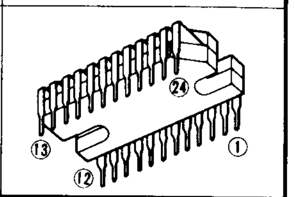
IC304 (DN860)

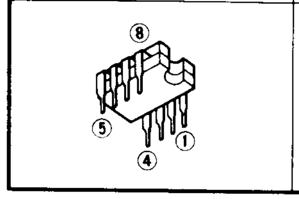
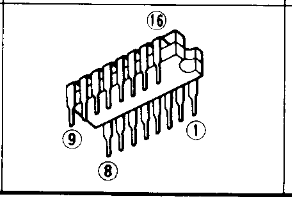
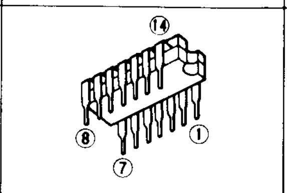
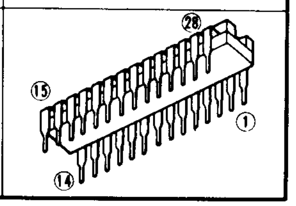
	Start	Stop		Start	Stop		Start	Stop
①	9.3V	9.3V	⑦		Same as at left	⑪	0V	0V
②		Same as at left				⑫ ⑬	4V	4V
			⑧		0V	⑭	0V	0V
③		Same as at left				⑮		Same as at left
④	0 V	3.2V	⑨		4V	⑯		0V
⑤	3.2V	0 V						
⑥		Same as at left	⑩		Same as at left			

IC305 (MN6042)

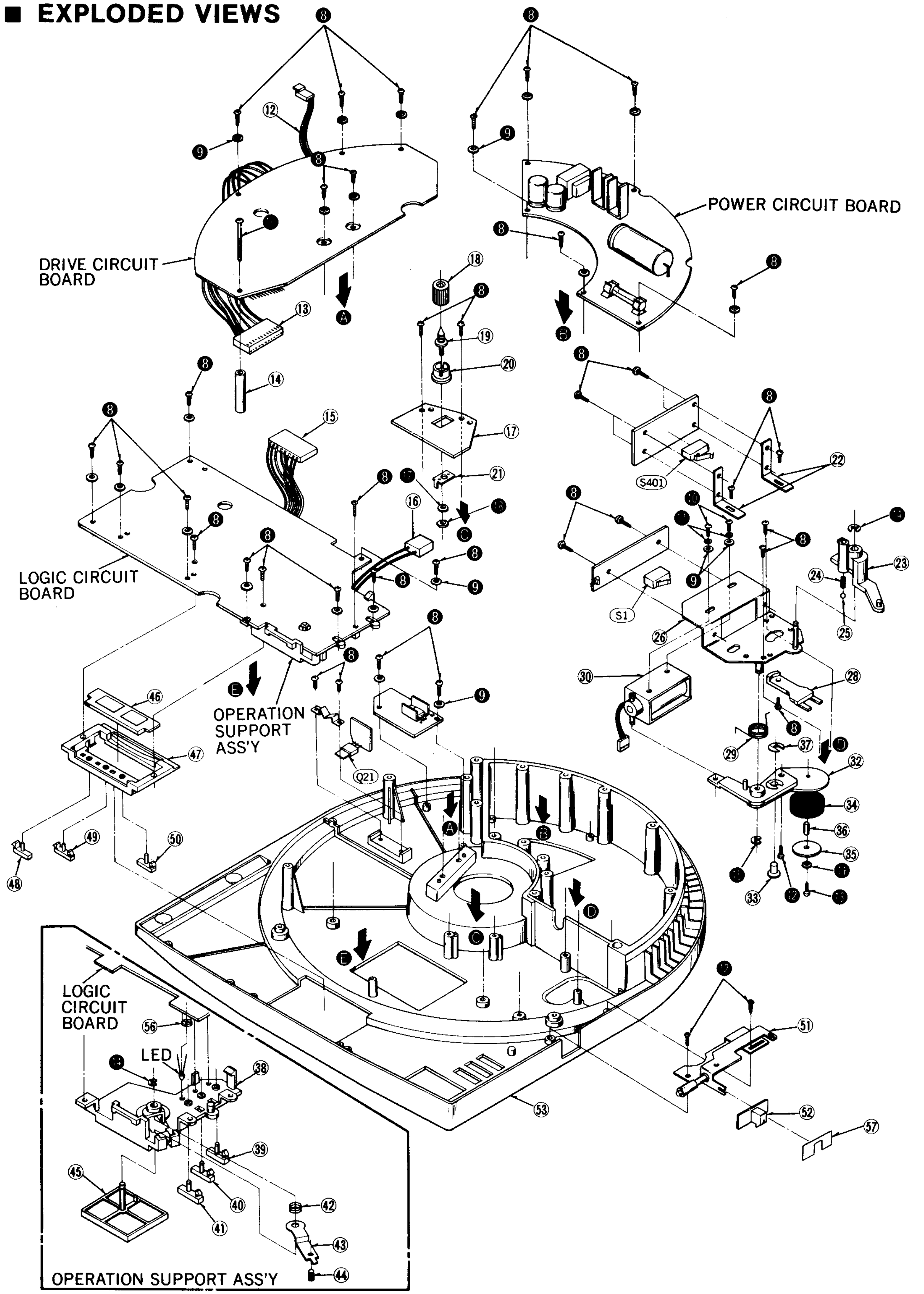
	Start	Stop		Start	Stop		Start	Stop
① ② ③ ㉗ ㉘	4.6V	4.6V	⑯		Same as at left	㉑		Same as at left
						㉒		Same as at left
④⑧ ⑤⑨ ⑥⑲ ⑦	0 V	0 V	⑰ ⑱		Same as at left	㉓	1.8V	1.8V
						㉔	2.2V	2.2V
						㉕		Same as at left
⑩ ⑪ ⑫ ⑬ ⑭ ⑮		Same as at left	⑳		Same as at left	㉖		Same as at left

■ TERMINAL GUIDE OF TRANSISTOR AND IC

2SD636, 2SD639 2SB641, 2SB643	2SD592, 2SC828A 2SC1383	2SC1846, 2SA886 2SC1847	2SD712A-C 2SC1826	AN640G
				

SVIUPC4558C	AN660, DN860	SVIMSM4013 SVIM53217P	MN6042
			

■ EXPLODED VIEWS


DRIVE CIRCUIT BOARD
POWER CIRCUIT BOARD
LOGIC CIRCUIT BOARD
OPERATION SUPPORT ASS'Y
S401
S1
Q21
LOGIC CIRCUIT BOARD
LED
OPERATION SUPPORT ASS'Y
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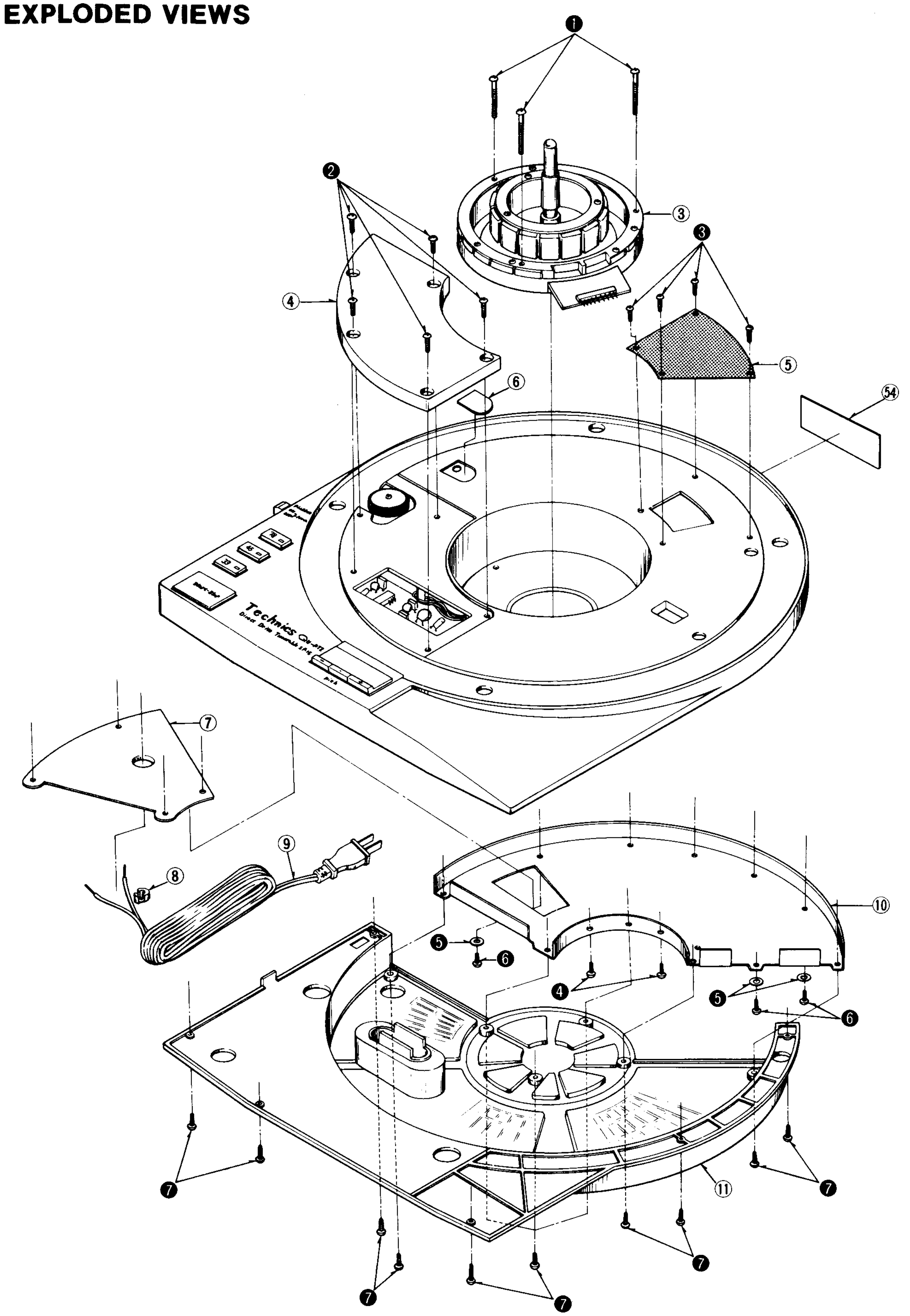
■ EXPLODED VIEWS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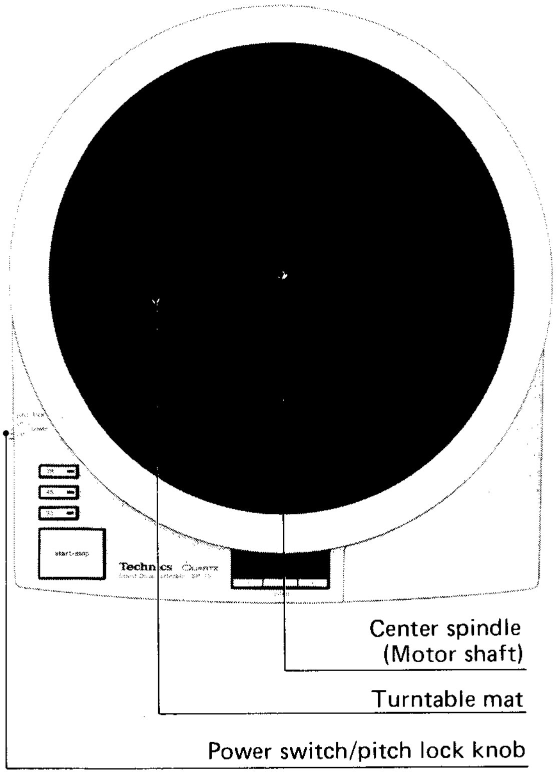
■ REPLACEMENT PARTS LIST

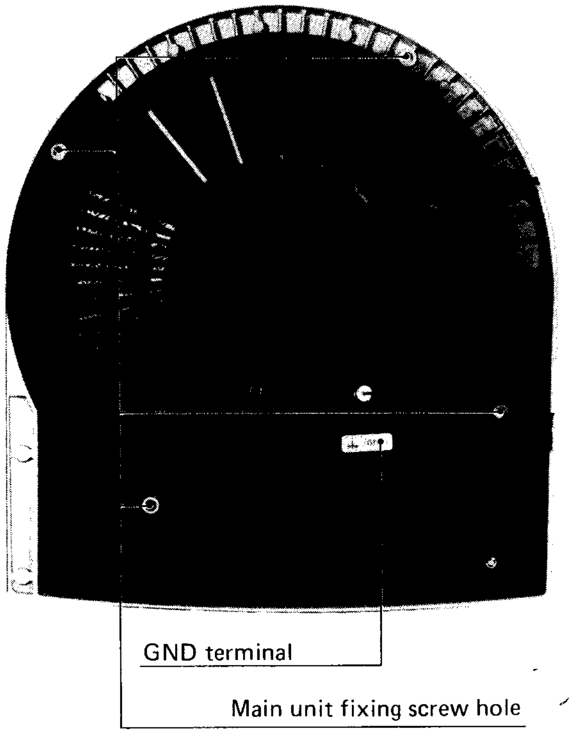
Notes: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.
2. ⚠ indicates that only parts specified by the manufacturer be used for safety.

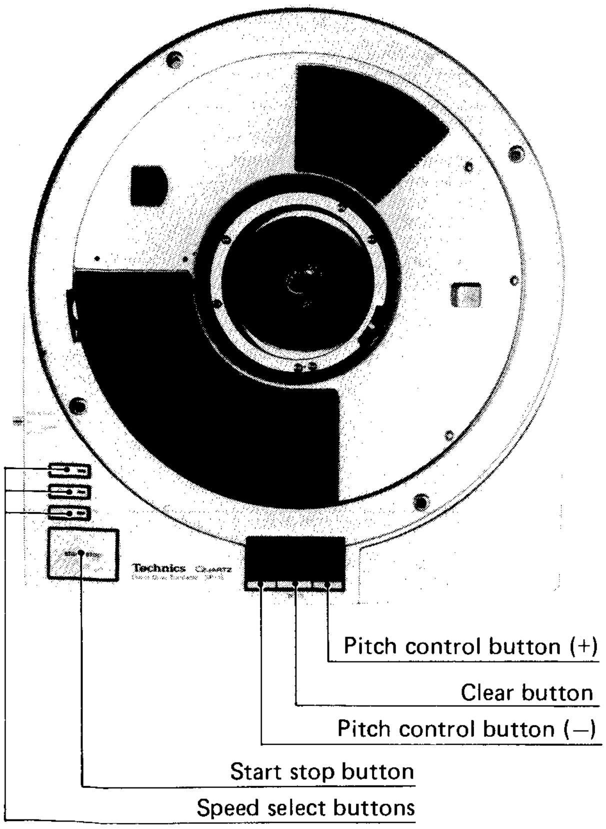
Ref. No.		Part No.	Part Name & Description
CABINET and CHASSIS PARTS			
1		SFTG015-01	Turntable Mat
2		SFTE015-01A	Turntable
3		SFMZ015-02Z	Stater Frame Ass'y
4		SFUM015-07	Cover, Turntable
5		SFUP015-09	Plate, Shield, Turntable
6		SFUP015-13	Cap, Turntable
7		SFUP015N01	Plate, AC Cord
8		SFSR4N4	Bushing, AC Cord
9	⚠	RJA23ZC-K	AC Cord
10		SFUP015-12	Plate, Shield, Power Circuit
11		SFUM015-09	Cover, Bottom
12		SFDJ015-02E	Connector, Power Circuit
13		SFDJ134-01E	Connector, Stater Frame Ass'y
14		SFXO015-01	Pipe, Logic Circuit Screw
15		SFDJ015-03E	Connector, Drive
16		SFDJ015-01E	Connector, Pitch Lock Switch
17		SFUP015-04	Plate, Ground Wire
18		SNE273-1	Knob, Ground Terminal
19		SNE271S	Screw, Ground Terminal
20		SGE401	Ornament, Ground Terminal
21		SJT719	Spacer, Ground Terminal
22		SFUP015-10	Bracket, Power Circuit
23		SFUM015-03	Cam, Power Switch
24		SFQA015-02	Spring, Power Switch Cam
25		SFYB-M30	Ball, Power Switch Cam
26		SFUP015-03E	Bracket, Power Switch
28		SFUM015-04	Cam, Pitch Lock Switch
29		SFQS015-01	Spring, Brake
30		SFDZ015-01E	Solenoid Ass'y
32		SFUM015-06E	Brake Ass'y
33		SFXJ015-06	Shaft, Eccentricity
34		SFUZ015-01	Roller, Brake
35		SFUP015-14	Spacer, Roller
36		SFXO015-02	Pipe, Roller
37		SFXW130-01	Circlip, Roller
38		SFUM015-01	Plate, Operation
39		SFKT015-03E	Knob, Speed Select (78 rpm)
40		SFKT015-02E	Knob, Speed, Select (45 rpm)
41		SFKT015-01E	Knob, Speed Select (33 rpm)
42		SFQA015-01	Spring, Supporter
43		SFUP015-07	Supporter, Switch
44		SFRTN30115B	Screw, Supporter
45		SFKT015-06	Knob, Start/Stop
46		SFUM015-05E	Supporter, Logic Circuit
47		SFUM015-02	Plate, Operation
48		SFKT015-08	Knob, Operation (C)
49		SFKT015-04	Knob, Operation (A)
50		SFKT015-05	Knob, Operation (B)
51		SFUP015-08Z	Plate, Slider
52		SFKT015-07	Knob, Power Switch
53		SFAC015-01	Cabinet, Panel
54		SFNN015N01	Name Plate
56		SFUM015-11	Spacer, LED

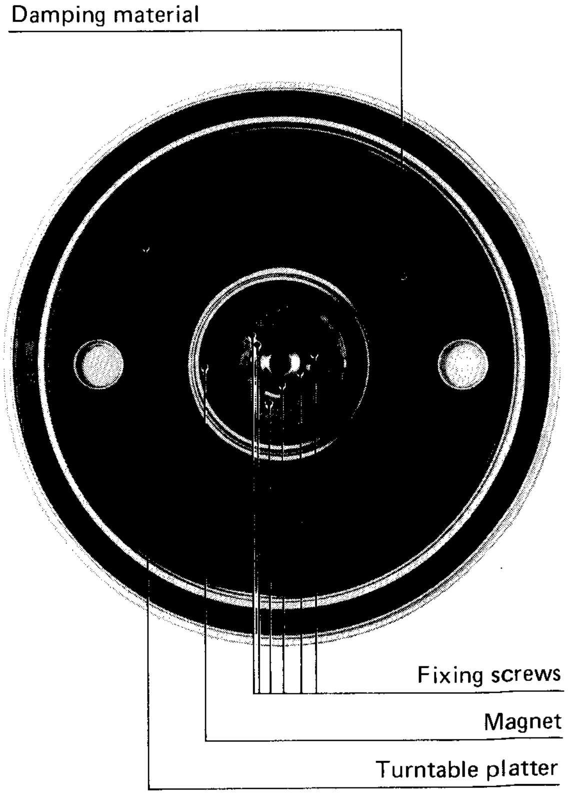
Ref. No.		Part No.	Part Name & Description
57		SFUP015-15	Cover, Power Switch
SCREWS and CIRCLIPS			
❶		**XTN3+30B**	Screw
❷		**XTN3+8BFZ**	Screw
❸		**XTN3+6BFZ**	Screw
❹		**XTN3+10B**	Screw
❺		**XWG3FZ**	Washer
❻		**XTN3+10BFZ**	Screw
❼		**XTS3+10BFZ**	Screw
❽		**XTN3+8B**	Screw
❾		**XWG3**	Washer
●		**XSN3+6S**	Screw
●		**XWA3B**	Washer
●		**XTN3+6B**	Screw
●		**XSN3+12S**	Screw
●		**XUC3FT**	Circlip
●		**XUC4FT**	Circlip
●		**XTN3+40B**	Screw
●		**XWA4B**	Washer
●		**XNG4ES**	Nut
ACCESSORIES			
A1		SFNU015N01	Instruction Book
A2		SFWE010	Adaptor, 45 r.p.m
A3		SFEL028-01E	Ground Wire
A4		XMM41+32FU	Screw
A5		SFXW028-01	Washer
A6		SFNU015-03	Instruction, Dimension Drawing
A7		SFYF07A10	Polyethylene Bag
PACKING PARTS			
P1		SFHP015M01	Carton
P2		SFHH015-01	Pad (Left)
P3		SFHH015-02	Pad (Right)
P4		SFHH015-03	Pad
P5		SFHD015-01	Pad, Top
P6		SFYF60A60	Polyethylene Bag, Unit
P7		SFYH40X45	Polyethylene Bag, Turntable
P8		SFYF10A30	Polyethylene Bag, Cord

■ PARTS IDENTIFICATION


Technics Quartz
Center spindle (Motor shaft)
Turntable mat
Power switch/pitch lock knob


GND terminal
Main unit fixing screw hole


Technics Quartz
Pitch control button (+)
Clear button
Pitch control button (–)
Start stop button
Speed select buttons


Damping material
Fixing screws
Magnet
Turntable platter

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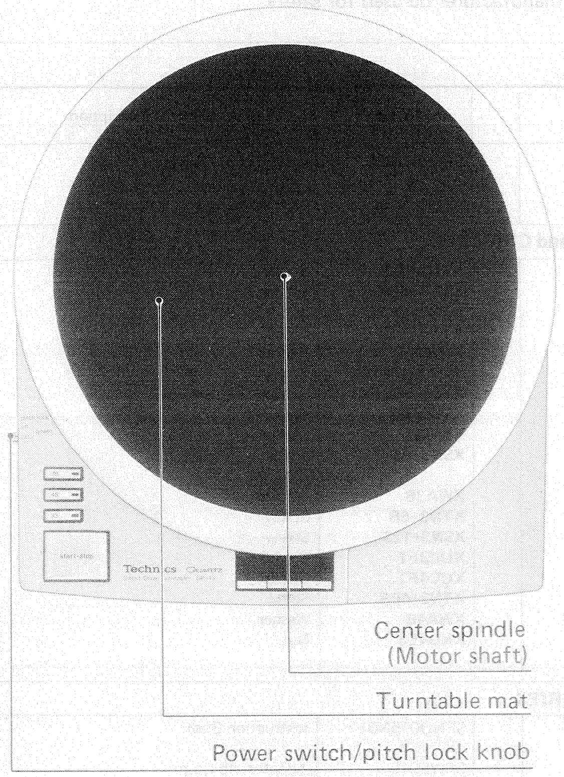
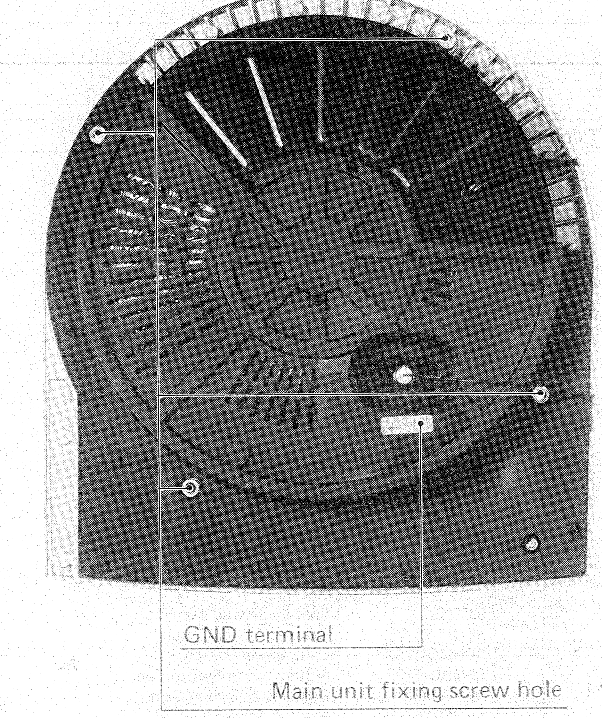
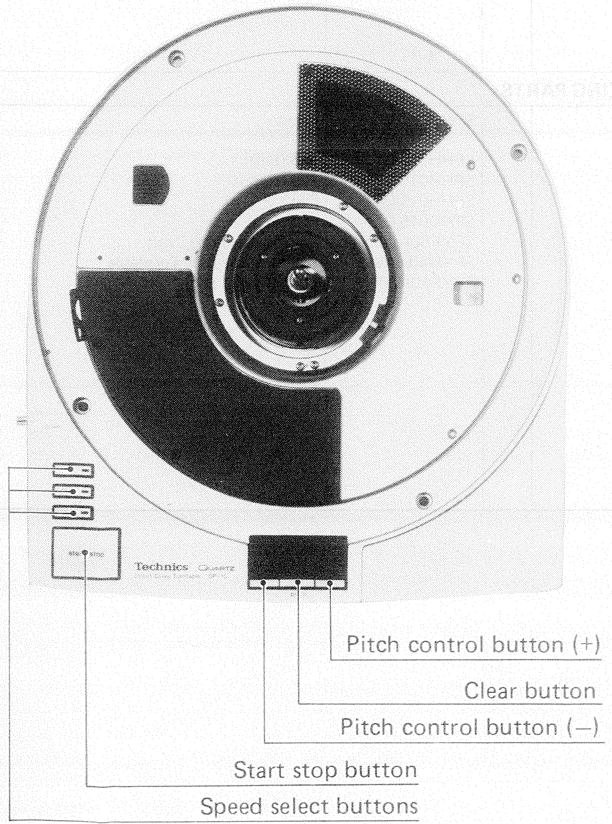
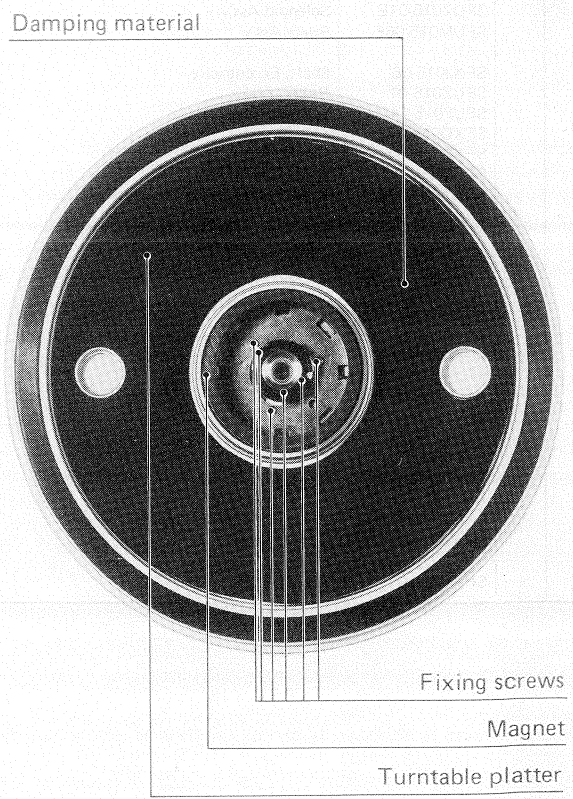

Center spindle
(Motor shaft)
Turntable mat
Power switch/pitch lock knob


GND terminal
Main unit fixing screw hole


Pitch control button (+)
Clear button
Pitch control button (−)
Start stop button
Speed select buttons


Damping material
Fixing screws
Magnet
Turntable platter

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